EXCHANGE RATES AND SOVEREIGN RISK

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ABSTRACT

EXCHANGE RATES AND SOVEREIGN RISK

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In recent decades, economic crises have hit Asia in the ‘90s, Latin America in the 2000s, and global finance in 2007, which signals the importance of analyzing the crisis.

In this study, in order to study the crisis and its determinants, we first analyze the occurrence rate of banking, systematic, currency, inflation, domestic debt in default and sovereign external debt crises observed between 1800 and 2016 by classifying 64 countries into financial centers, non-financial centers, developed countries, developing countries, emerging market countries. The period under scrutiny is subdivided into the First World War (1914-1918), the Great Depression (1929), the Second World War (1939-1945), the First Oil Crisis (1973), the Second Oil Crisis (1979) and the Great Recession (2008), and the impact of these events on the occurrence rate of crises is investigated. The First World War increased the incidence of currency crises, the Great Depression increased the incidence of external debt crises, the First Oil Crisis increased the incidence of currency crises, and the Second Oil Crisis increased the incidence of banking crises. The results of the analysis of crises for country groups show that sovereign debt crisis has the highest incidence rate. This result leads the study on sovereign debt crisis to consider

sovereign default as a precursor to sovereign debt crisis and to analyze sovereign default with sovereign risk. In this study, credit default swap is applied as a method of measuring sovereign risk. The questions that the analysis aims to answer are the effect of exchange rate on sovereign risk for all country groups and emerging market economies. Subsequently, we plan to investigate the potential reverse causality that may arise in this relationship. We will then investigate the impact of exchange rate regime and capital openness on this relationship. We investigate the impact of exchange rate effects by applying the fixed effect panel data model for both all country groups and the emerging market economies country group. According to the results of the analysis, we report that the exchange rate has a statistically significant effect on the credit default spread for both sets of countries and exchange rate volatility has a statistically significant effect on the credit default spread for emerging market economies. We apply a two-stage system GMM procedure taking into account potential reverse causality and find that the panel system GMM results are broadly similar to the results from a panel fixed effects approach. Exchange rate regime is reported to be a determinant factor for both sets of countries, with the highest marginal contribution of exchange rate and exchange rate volatility obtained in the flexible exchange rate regime, especially for emerging market economies. Moreover, capital openness is a factor that affects the marginal impact of both the exchange rate factor and the marginal impact of domestic and international factors, and it is estimated that the highest marginal impact of the exchange rate and exchange rate volatility affect credit default swaps, especially for high capital openness country groups.

Keywords: Financial Crisis, Sovereign Debt, Foreign Exchange, Crisis Management, Panel Data Models

ÖZ

DÖVİZ KURLARI VE ÜLKE RİSKLERİ

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2000'li yıllarda Asya ve Latin Amerika'yı ve 2007 yılından itibaren ise tüm dünyayı etkisini altına alan ve farklı isimlendirmelerle tanımlanmış olan, literatürün genel anlamda kriz olarak tanımladığı durumun, ortaya çıkan sonuçlar gözlendiğinde araştırılabilir bir konu olarak önemini korumaktadır.

Bu çalışmada, kriz ve belirleyicileri üzerine çalışmak amacıyla, ilk aşamada 1800-2016 yılları arasında gözlemlenen Bankacılık, sistematik, para birimi, enflasyon, temerrüde düşen kamu iç borç ve kamu dış borç krizlerinin gerçekleşme oranını araştırmak için 64 ülke, finans merkezleri, finans dışı (finansal olmayan) merkezler, gelişmiş ülkeler, gelişmekte olan ülkeler, yükselen piyasa ülkeler olmak üzere sınıflandırarak analizi yapılıyor. İncelenmekte olan dönem Birinci Dünya Savaşı (1914-1918), Büyük Buhran (1929), İkinci Dünya Savaşı (1939-1945), Birinci Petrol Krizi (1973), İkinci Petrol Krizi (1979) ve Büyük Durgunluk (2008)olayları ayrı dönemler içerisinde incelecek şekilde alt bölümlere ayrılarak, belirleyici olayların krizlerin ortaya çıkma oranına olan etkisi hesaplanıyor. Birinci Dünya Savaşının döviz krizi, Büyük Buhran ise dış borç krizinin, Birinci Petrol Krizi ise döviz krizinin, İkinci Petrol Krizi Bankacılık krizinin yaşanma oranını arttırmıştır.

Krizlerin ülke grupları için analiz sonuçları ise kamu dış borç krizinin en yüksek görülme oranına sahip olduğunu göstermektedir. Bu sonuç ise çalışmanın devamında kamu dış borç krizine üzerine çalışmaya kamu dış borç krizi öncüsü olarak kamu temerrüdünü görmekte ve kamu temerrüdü olma durumunu kamu riski ile analiz etmektedir. Bu çalışmada, ülke riskini ölçme yöntemi olarak ise kredi temerrüt takası uygulanmaktadır. Analizle cevaplanması amaçlanan sorular ise tüm ülke grubu ve yükselen piyasa ekonomileri için; döviz kurunun kamu riskine olan etkisi araştırılıyor. Devamında ise elde edilmiş olan bu ilişkide ortaya çıkma ihtimali olan potansiyel ters nedenselliği araştırmayı planlıyoruz. Devamında bu ilişkinin döviz kuru rejiminin ve sermaye açıklığının etkisini araştırılacaktır. Döviz kuru etkilerinin etkisini hem tüm ülke grupları hem de yükselen piyasa ekonomileri ülke grubu için sabit etkili panel veri modelini uygulayarak araştırıyoruz. Elde edilen analiz sonuçlarına göre, her iki grup için döviz kurunun her iki ülke seti için kredi temerrüt farkını istatistiksel olarak anlamlı düzeyde etkilediğini ve döviz kuru oynaklığının yükselen piyasa ekonomileri için kredi temerrüt farkını istatistiksel olarak anlamlı düzeyde etkilediğini rapor etmektedir.

Potansiyel ters nedensellik dikkate alınarak iki aşamalı sistem GMM prosedürü uygulanmakta ve panel sistem GMM sonuçlarının panel sabit etkiler yaklaşımı uygulayan sonuçlara büyük ölçüde benzediği sonucuna ulaşmaktayız. Döviz kuru rejiminin her iki ülke seti için de belirleyici bir faktör olduğu, özellikle yükselen piyasa ekonomileri için döviz kurunun en yüksek marjinal katkısının esnek döviz kuru rejiminde elde edildiği ve döviz kuru oynaklığının elde edildiği rapor edilmektedir. Ayrıca sermaye açıklığı hem döviz kuru faktörünün hem de yurt içi faktörlerin ve uluslararası faktörlerin marjinal etkisini etkileyen bir faktör olup, özellikle döviz kurunun en yüksek marjinal etkisi ve döviz kuru oynaklığının kredi temerrüt takaslarını etkilediği yüksek sermaye açıklığı olan ülke grupları için tahmin edilmektedir.

Anahtar Kelimeler: Finansal Kriz, Devlet Borçları, Yabancı Kambiyo, Kriz Yönetimi, Panel Veri Modelleri

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LIST OF ABBREVIATIONS

CDS : Credit default swap (Kredi Temerrüt Takası)

GDP : Gross Domestic Product (Gayri Safi Yurt İçi Hasıla)

IMF : International Monetary Fund (Uluslararası Para Fonu)

LCU : Local Currency Unit (Yerel Para Birimi)

EMEs : Emerging Market Economies (Yükselen Piyasa Ekonomileri)

CHAPTER 1

INTRODUCTION

Sovereign debt is broadly defined as the debt of a country's government. Sovereign debt is comparable to government debt. While both types of debt belong to the government, they differ in terms of currency. Sovereign debt, consists of bonds issued in foreign currency or loans from international financial institutions. The sum of the debts of both domestic and foreign creditors is considered "national debt". While sovereign debt is acquired on the promise of repayment, in some cases repayment does not occur and sovereign debt results in sovereign default.

According to the IMF's Finance and Development Report (2021), sovereign debt has undergone significant changes since 1880, particularly during the first period of financial globalization (1880-1913). During this era, the average debt ratio in advanced economies fell from 45 percent of GDP in 1880 to 29 percent in 1913. The gold standard, predominant during this period, led to unprecedented private capital inflows and trade inflows that stimulated growth while reducing sovereign debt ratios.

The second era began with the outbreak of World War I, during which average debt ratio reached its lowest ever - 23 percent of GDP in 1914. However, debt began to climb rapidly thereafter. World War I (1914-18) and the financial crisis that followed caused a spike in debt in advanced economies. A decline in debt during the 1920s was followed by two more spikes related to the Great Depression (early 1930s) and World War II (1941-45).

The third period, known as the "Great Peak," occurred during the Great Depression, during which the debt ratio peaked at 80 percent of GDP following various episodes of banking and currency crises. While the impact of the most recent crisis is less

significant than that of the Great Depression, the argument for sovereign debt has become more compelling. This is due to the increase in advanced G-20 economies' debt ratios by 20 percentage points of GDP since 1928. Additionally, the significant decline in trade and energy prices and financial sector support have made it harder to reduce debt ratios during the Depression.

The global financial crisis of 2007-08 has taken a toll on the world economy, particularly on the public finances of advanced economies. Sovereign debt has increased significantly in recent times, rising from 70 percent of GDP in 2000 to 100 percent in 2009.

The evolution of sovereign debt over time has been assessed by Reinhart et al. (2011), who find that sovereign debt in advanced economies has recently fluctuated to levels not recorded since the end of the Second World War. From the beginning to the end of 2010, the average sovereign debt/GDP ratio for all advanced economies hovered around the peaks reached just before the Second World War, during the First World War and the Great Depression. On the other hand, Reinhart et al. (2003) show that for emerging market countries, large sovereign debt increases do not start quickly and rarely painlessly. In particular, debt-to-GDP ratios rarely decline completely throughout stable and strong economic growth. The identification of sovereign debt as a cause of crisis supports the research by Reinhart et al. (2010) on the effects of sovereign debt. The study reports the relationship between debt, inflation, and growth and concludes that higher debt/GDP levels are associated with significantly lower growth outcomes for both developed and emerging markets. It adds that much lower levels of external debt/GDP are associated with negative outcomes for emerging markets.

The impact of sovereign default on growth has been analyzed by Kumar et al. (2010) and Cecchetti et al. (2011) show statistical support for a similarly large downward growth effect. Reinhart et al. (2012) find support for previous research: periods of high public debt are associated with one percent lower growth than other periods. Domestic public debt has for a long time been ignored, and the emerging markets extraction boom of the 2000s is something entirely new and different, as revealed by the benchmark study by Reinhart et al. (2010).

According to the estimation results of Jeanne et al. (2006), it is generally accepted that "dangerous" forms of debt, especially short-term and/or foreign currency debt, make emerging market countries (EMEs) vulnerable to crises and are so destructive that they are difficult to manage. The arguments of Jeanne et al. (2006) make EMEs questionable as a distinct group in terms of the impact of sovereign debt and then pursue this impact as a cause of the crisis. The differentiation of crisis effects due to the country group proposal of Jeanne et al. (2006) is also investigated by Reinhart et al. (2013). Similarly, after the most severe crisis the world has ever known, advanced economies diverged a lot from their emerging market counterparts. Following the 2007-08 financial crisis, advanced economies were much more successful in managing the consequences of the crisis, largely due to their ability to implement countercyclical policies. While the devastating effects of the crisis, especially the sovereign debt crisis, have been noted by previous research, Rogoff (2011) argues that, on the contrary, the wave of sovereign defaults could be a challenge for the global economy, but also an important opportunity for research economists to rethink their sovereign debt models.

In this context, it turns out to be crucial to analyze sovereign default in this environment. The term sovereign risk is used to describe the risk that a government will default on its debt obligations to its creditors, as noted by Heffernan (1986) and Sturzenegger et al (2007). IMF (2010) notes that there is no exact formula for measuring sovereign risk, but it is measured by credit ratings, sovereign bond yield spreads and credit default swaps.

Cantor et al. (1996) analyzed the determinants and effects of sovereign credit ratings by two leading agencies, Moody's and Standard and Poor's, and reported that macroeconomic indicators of rating agencies are important in determining a country's rating. Similar to the measurement technique of Cantor et al. (1996), for sovereign credit ratings, Afonso (2003) investigated the determinants of sovereign credit ratings by analyzing the leading rating agencies Moody's and Standard and Poor's. Similar to previous results, this study concludes that macroeconomic indicators are the most important factor in determining a country's credit rating. Gadanecz et al. (2014) analyzed bond yields proxying for sovereign default to analyze the role of

exchange rate risk in affecting local currency government bond yields in emerging market economies (EMEs). It pointed to an important effect of exchange rate risk: if exchange rate volatility increases, investors need a larger yield compensation to hold EME local currency government bonds. More recently, Saji (2021) revisited the hypothesis proposed by Cantor and Pecker (1996) to investigate the relationship between sovereign ratings and bond yield spreads in emerging markets and conducted a comparison of sovereign ratings and bond yield spreads. They also find that ratings do not report the full picture of macroeconomic conditions in emerging markets and that there is a great deal of cumulative information in publicly available macroeconomic variables that is much more useful in predicting bond yield spreads than that embedded in sovereign ratings. A comparison of CDS and yield spreads is analyzed by Zhu (2006). The findings confirm the theoretical prediction that bond spreads and CDS spreads move together in the long run. However, this relationship does not always hold in the short run. By investigating the dynamic linkages between the two spreads, it is reported that the CDS market usually moves ahead of the bond market in price adjustment. In addition to previous research, Tang et al. (2008) analyzed macroeconomic conditions that significantly affect CDS spreads and also showed the importance of the interaction between market conditions and a firm's specific characteristics. Zhang et al. (2009) report that volatility, measures of jump risk, macroeconomic conditions and a firm's balance sheet information significantly affect CDS spreads. The impact of regional differences on the determinants of credit default swap spreads is analyzed by Hassaan et al. (2019).

On the other hand, a global perspective analysis based on credit default swaps was conducted by Durduabalerro, Farhi and Gourinchas (2008), who proposed another analytical framework for global imbalances that emphasizes the ability of countries to generate financial assets for global savers/insurers. In addition to these studies, global imbalances are believed to be an important macroeconomic determinant of sovereign risk (Back, Bandopadhyaya and Du (2005); Wu and Zhang (2008); Hilsher and Nosbush (2010); Durdu, Mendoza and Terrones (2013)) and are therefore priced into the term structure of CDS spreads (Pan and Singleton (2008); Longstaff, Pan, Pedersen and Singleton (2011)). Moreover, Huang et al. (2012) analyze the relationship between foreign exchange trading and position unwinding risk and their

impact on sovereign credit premiums. Gourinchas and Rey (2007); and Cabarello, Farhi and Gourinchas (2008) based their analysis on the theory that a country's external adjustment to global imbalances occurs through the exchange rate valuation channel.

However, the literature provides mixed results on the impact of exchange rate on sovereign default. Goldstein et al.'s (2000) research suggests focusing on equity returns rather than market exchange rate expectations and sovereign ratings for emerging markets, while Gadanecz et al. (2014), on the other hand, show the significant impact of exchange rate risk: when exchange rate volatility increases, investors require a larger return compensation for holding EME local currency government bonds.

By considering the previous research contributions, this thesis aims to find whether the exchange rate has any impact on sovereign default or not. It investigates whether the impact changes depending on the country type or not and analyze the effect of the exchange rate regime on the link between the exchange rate and sovereign default. Also, it is targeted to analyze whether capital openness has any effect on the relationship between exchange rate and sovereign default, which is proxied by Credit default swap spreads.

The literature has produced mixed results on the impact of exchange rates and credit default swap spreads. While the traditional literature claims that there are possible causes that influence the impact of the indicators, the dominant determinants are argued to depend on exogenous indicators, in particular the exchange rate regime as investigated by Domac et al. (2000). Fixed exchange rate regimes, after controlling for macroeconomic, financial, and exogenous fundamentals, reduce the likelihood of banking crises, especially in developing countries (DE), as noted in the pioneering work by Domac et al. (2000).

In addition, the determinants of sovereign default are also influenced by capital openness as presented by Lorca (2021). Lorca investigated the case of portfolio capital flows to emerging markets by measuring the impact of interest rate, risk

aversion and commodity price volatility and reported that a change in capital flows accounted for about one-third of total activity across the country sample of the study. In contrast, Eichengreen et al. (1998) argue that capital account liberalization probably has two distinct effects, the first mechanism being one in which domestic and external financial stability are largely the same. The second mechanism is that it is not financial liberalization that is at the root of the problem, but rather the inadequacy of supervision and regulation, the consequences of which are amplified by liberalization. Moreover, the literature has controversial implications for potential reverse causality, where the direction of causality between credit default swaps and the exchange rate factor can go in either direction. From one perspective, exchange rate movements and volatility may affect credit default swaps, while on the other hand, some argue that causality runs from credit default swap spreads to the exchange rate, as reported by Liu et al. (2012). This research aims to explore these important issues.

The fundamental contents of this thesis are as follows. Chapter 2 presents a discussion of the descriptive analysis of crisis to investigate the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt default, and sovereign external debt default. To this end, it uses an unbalanced annual panel dataset for all countries, financial centers, non-financial centers, advanced countries, developing countries, and emerging countries over the 1800 – 2016 period. This chapter presents that the most frequent type of crisis for all countries, developing countries, and non-financial centers groups is sovereign external debt. While currency crisis is the most frequent type of crisis for advanced and emerging countries, banking crisis is the most frequent type of crisis for financial centers. This chapter reports that the least frequent type is domestic debt in default for all countries, advanced countries, emerging countries, non-financial centers, and financial centers. Separately, for developing countries, the least frequent type of crisis is systematic crisis. This chapter figured out that, similar to the perspective of Reinhart et al. (2008) crises are different from each other, but they also have similarities. Because of this, analyzing the most frequent type of crisis means at the same time being interested in all the other types of crises. Depending on the estimation results, sovereign external debt is the most frequent type of crisis.

Analyzing the crisis will also help to offer some suggestions about the other types of crises at the same time.

Chapter 2 also investigates the time relation of credit default swaps and exchange rates. That information is obtained for all countries, advanced countries, developing countries, emerging countries, financial centers, and non-financial centers, where values are analyzed for the period between 1995 and 2020. The whole period is analyzed in halves, for all countries, both indicators move in opposite directions for each period for all analyzed country types. We find that CDS and exchange rate move in opposite directions in analyzed periods for all country sets. Those results are consistent with the study of Corte et al. (2021), which reports a rise in a country's sovereign risk as measured by credit default swap spreads, is accompanied by a significant depreciation of its currency.

In Chapter 3, we investigate the main determinants of sovereign default, especially we will target to analyze whether the impact changes depending on the country type or not. We investigate to find whether the exchange rate has any impact on sovereign default or notand whether the impact changes depending on the country type or not. Chapter 3.1 presents a brief review of the literature on the determinants of sovereign defaults. To empirically investigate the main determinants of sovereign defaults, in Chapter 3.2, we first consider the simple benchmark equation that attempts to explain sovereign defaults. Indicators are selected in the guidance of previous research from 3 leading credit rating agencies (Moody's, Standard and Poor's, and Fitch) with the constraint of data availability. In this context, we maintain the main indicator groups.

Table 1. Indicators and their groups.

Group Name	Indicators
Exchange Rate factors	Official Exchange Rate (LCU per US Dollar), Exchange Rate Volatility (LCU per US Dollar)
Domestic Factors	GDP per capita growth (annual %), Inflation, consumer prices (annual%), Claims on private sector (annual growth as % of broad money), External Debt Stocks to GNI, FDI to GDP, Official reserves to GDP, General Government Debt to GDP, Current Account Balance to Cars (%)
International Factors	World Governance Indicators, VIX

Also in Chapter 3, we aim to analyze whether capital openness has any effect on the relationship between exchange rate and sovereign default and whether capital openness has any effect on the relationship between them. While investigating this relationship, it is considered as a view that Liu et al. (2012) claim that exchange rate movements and volatility can affect credit default swaps. By considering this, Chapter 3.3.1 considers reverse causality. In addition, as stated previously the sovereign default determinant factors are also affected by capital account openness which is claimed by Lorca (2021). The sovereign default determinant factors are also affected by capital account openness, which is claimed by Lorca (2021). Chapter 3.3.2 considers the effect of capital account openness on sovereign default. Also, as indicated by Domac et al. (2000), the sovereign default determinants change according to the exogenous factors, especially exchange rate regimes, thus Chapter 3.3.3 analyzes the impact of exchange rate regimes on sovereign default.

The flow of this thesis is as follows. Chapter 2 reports the definition of the crises and explains the types of crises. Also, this chapter presents the definitions that are used by previous research. Section 2.1.1 defines the country set separately and data groups. Then we make a descriptive analysis of the crises for all country groups. Section 2.2 reports the main findings of the analysis till the end of this part. Section 2.3 reports the previous research on the sovereign default determinants and makes an analysis between CDS and Exchange Rate. Section 2.4 explains the main findings of this section. Section 2.5 assesses the macroeconomic effects of the crises, especially the sovereign default crisis. Section 2.6 reports on the determinants of sovereign external default by analyzing prior research. Section 2.7 analyzes the crises depending on their main causes and consequences of the crises. Section 2.7.1 presents literature that explains measuring sovereign default risk. Section 2.7.2 explains the determinants of the sovereign ratings. Section 2.7.3 presents sovereign credit rating agencies and their ratings. Section 2.7.4 defines CDS spreads and bond yield spreads. Section 2.7.5 analyzes crises by concentrating on sovereign external default. The relationship between credit default swaps and exchange rates is analyzed by reviewing previous studies. In Section 2.7.6 sovereign external default is analyzed by concentrating on answering the question: “Are credit default swaps and exchange rates correlated?”. Section 2.8 analyzes sovereign default as an overview. Section

2.8.1 defines “What is Sovereign Borrowing: Sovereign Debt?". In Section 2.8.2, we aim to answer: "What is the distinction of sovereign debt borrowing by presenting prior research’s estimation results?". Section 2.8.3 makes the explanation of sovereign debt restructurings and defaults. Section 2.8.4 discusses the following question: "When do Governments default?". Section 2.8.5 interprets the reasons that make governments prefer high and volatile sovereign risk. Section 2.8.6 considers the cost of sovereign default. Section 2.8.7 investigates access to external borrowing and the costs of external borrowing. Section 2.8.8 gives a general overview of direct sanctions and trade costs. In Section 2.8.9, default is accepted as a negative signal about the government or the state of the economy and analyzed with this perspective. In Section 2.8.10, domestic, financial, and political costs of sovereign default are reported. In Section 2.8.11, the output costs of sovereign defaults are quantified. In Section 2.9, we present a brief review of the literature for the panel data approach. Section 2.91, we present AR Order Specification Criteria.

In Chapter 3, we present our empirical results about the determinants of sovereign default and our analysis of the impact of the exchange rate on sovereign default. In Section 3.1, the exchange rate and sovereign default spread relationship are estimated with exchange rate factors, domestic factors, and international factors. In Section 3.2, we present our regression results about the determinant of the sovereign default and measure the impact of the exchange rate for All countries and EMEs. In Section 3.3, we resolve robustness controls for the significance of exchange rate factors. In Section 3.3.1, we make a robustness analysis for potential reverse causality. In Section 3.3.2, we estimate the robustness check for capital account openness. In Section 3.3.3, we analyze the robustness of the exchange rate regime. In Section 3.4, we present the main findings of the analysis till the end of this part.
Finally, Chapter 4, summarizes the main findings of the thesis and presents our pre-concluding notes.

CHAPTER 2

CRISIS: WHAT DOES IT MEAN?

Kindleberger et al. (2005) argue that for historians every event is unique, while economists, by contrast, note that there are patterns in the data and that specific events are likely to lead to similar responses. History is specific; economics is general, and the monetary history of the last four hundred years is full of financial crises.

Crisis is used to describe different types of situations. As explained by Kaminsky et al. (1998), economic history uses the term for different circumstances. In the late 1980s, it is argued that Latin American countries experienced banking crises, which led to recessions as a chain of high debt burdens led to successive devaluations. Subsequently, the "crisis" took different forms in different countries with similarly devastating effects, as in the case of the Tequila currency crisis of 1994-1995. This crisis, as Miskhkin (1999) emphasizes, shows the different failures of economies; different policies are needed to promote recovery in emerging market countries than those applied to industrialized countries. In 1997, another "crisis" emerged, the so-called "Asian flu". "The Crisis" as assessed by Goldstein (1998) emphasizes that financial sector weakness in the emerging economies of Asia made global liquidity conditions difficult, raised concerns about external sector problems in these economies, and spread to other countries from Thailand to Indonesia, Malaysia and the Philippines, then to North Asia and finally from Brazil to Russia. Another "Crisis" was the "Russian Virus" in Russia in 1998. Chido et al. (2002) argue that the causes of the Russian Monetary Crisis were fixed exchange rates, fiscal deficits, debt and the conduct of monetary policy. Besides the crisis, a new term entered the crisis literature: "contagion", used by Goldstein (1998) and Kaminsky et al. (1998) for the situation, refers to the spread of the crisis to different countries through some

contagion-based channels. In recent years, another "crisis" occurred in 2008, Reinhart et al. (2008) argue that most of the historical crises were preceded by financial liberalization and that while the crisis started in the United States, many European countries such as Spain, the United Kingdom and Ireland started to experience housing price pressures. The researcher notes that the crisis may show similarities across countries.

Since the term crisis is used to state different types of problematic situations, definitions of different types of crises become important. While there are enormous data sets that supply data about crisis, we aim to work on a data set that covers different types of crises for different income groups for the widest time interval, which is from the beginning of the 1800s till 2016. This is the most comprehensive data set for the different types of crises defined and classified by Reinhart and Rogoff online data sources. That data source defines the crises as banking crisis, systemic crisis, currency crisis, inflation crisis, domestic debt in default, sovereign external debt in default for 70 countries that are from different income groups.

In the following steps of the analysis, the crisis analysis is done by using the Reinhart and Rogoff data sets to present a wide range of crises for the most suitable time period. Because of this, in this part of the research, the crisis definitions are done according to Reinhart et al. (2000) and Reinhart (2021).

The table initially presents the type of crisis and then gives the definition of the crisis. After the name and definition of the crisis, then the previous research that work on the defined crisis and applies the same definition are listed as follows:

In addition to the definition of Reinhart et al, all types of crises are examined and defined by the literature as follows.

The currency crisis has been analyzed by Dornbush et al. (1995), who argue that overvaluation is highly unstable because in a liberalized financial environment it leads to mechanisms that promote excessiveness and intensify the ensuing financial distress and decrease in real activity. This is observable by the cases of Chile in the early 1980s, Mexico in 1982 and 1994, and Finland in 1992.

Table 2. Defining and dating crises varieties.

Crisis Type	Threshold or Criteria to "date" the crisis	Selected Studies
Banking Crisis	Concerning banking crises, our analysis emphasizes events. The main reason for following this approach is related to the absence of high-frequency data capturing when a financial crisis starts. If the beginning of a banking crisis is characterized by runs on banks and withdrawals, then changes in bank deposits can be utilized to mark crises. Usually, banking problems are not induced by liabilities but by a lengthy decline in asset quality, such as a collapse in real estate prices or increased bankruptcies in the non-financial sector. In this case, a large increase in bankruptcies or changes in asset prices or non-performing loans can be employed to signal the start of a crisis. However, stock market data are not available for some early crises in emerging markets. Indicators for business bankruptcies and non-performing loans are also generally available at low frequencies; the desire of banks to conceal their problems for as long as possible also makes these indicators less informative.	Reinhart et al. (2000); Joyce (2009); Hutchison et al. (2005)
Systematic Crisis	Event: The onset of a banking crisis is marked by one of two types of events: (1) bank failures leading to the closure, merger or public sector takeover of one or more financial institutions; and (2) if there are no failures, the closure, merger, takeover or large-scale government assistance of a major financial institution (or group of institutions), which signals the beginning of a similar sequence of outcomes for other financial institutions.	Conant (1919), Bernanke and James (1991), Eichengreen (1992), Caprio and Klingbiel (1996), Kaminsky and Reinhart (1999), Bordo et.al. (2001), Reinhart and Rogoff (2008), and Laeven and Valencia (2013) and (2020), Reinhart (2021)
Currency Crisis	Quantitative: The indices used to define currency crises range from univariate, based completely on fluctuations in the exchange rate (depreciation against the relevant anchor currency greater than a certain threshold); bivariate, which includes foreign exchange reserve losses; to trivariate, which adds a short-term policy rate to also catch interest rate defense.	Univariate studies: Frankel and Rose (1996); Reinhart and Rogoff (2009). Bivariate: Kaminsky and Reinhart (1999); tri-variate Eichengreen, Rose and Wyplosz (1996) ;Reinhart (2021)

Table 2. (continued)

Inflation Crisis	Quantitative: The annual (or 12-month) inflation rate exceeding a certain point. Reinhart and Rogoff (2009) utilize an annual rate of 20 percent because it covers the multi-century and pre-fixed-money periods. Other referenced studies concentrating on the modern period employ a threshold of 40 percent per annum.	Bruno and Easterly (1998) Reinhart and Rogoff (2003) and (2009), Ilzetzki, Reinhart, and Rogoff (2019), Reinhart (2021)
Domestic Debt in Default	Credit event: Reflects the definition of the state's inability to repay its external debt, but may have other actualizations, such as the forced conversion of bank deposits (either changing the currency or the maturity and other terms).	Reinhart and Rogoff (2009) and (2011), Reinhart (2021)
Sovereign External Debt	Credit event: Debt rescheduling, usually regarding the Paris Club creditors but in the last two decades also comprises debt restructuring with Chinese loans.	On Paris Club debt see Trebesch (2012), while on China's debt restructuring, see Horn, Reinhart and Trebesch (2019), Reinhart (2021)

The currency crisis and its indicators are also analyzed by Kaminsky et al. (1998) and it is shown that the indicator variables are: output, the ratio of broad money to gross international reserves, deviations of the real exchange rate from the trend, equity prices, and exports.

The literature's other crisis is the banking crisis, Kaminsky et al. (1999) analyze the balance of payments and banking crisis. The research examines the connections between banking crises and currency crises. It finds that banking sector problems typically observed before a currency crisis, a currency crisis worsens a banking crisis, while financial liberalization generally foregoes banking crises.

The systematic banking crisis and its relationship with the other crises are analyzed by Laeven et al (2008) and it is shown that crises in high-income countries are inclined to extend longer than crises in middle- and low-income countries and are associated with lower fiscal costs, higher output losses, and more general use of bank guarantees and expansionary macro policies. Banking crises are argued to have erupted in tandem with sovereign debt, and currency crises are also argued to have

followed the sovereign debt boom. It is concluded that these three crises occur together.

Financial crisis is another type of crisis, defined by Sufi et al. (2021) as follows: in a systemic banking crisis, a country's financial and corporate sectors experience a vast number of defaults, and companies and financial institutions encounter significant problems in repaying contracts on time. As a result, non-performing loans rise rapidly and all or most of the total banking system capital is depleted. This may be accompanied by a fall in asset prices, sharp increases in real interest rates and a slowdown or reversal of capital flows after the pre-crisis rises. In some cases, the crisis is caused by a run-on bank by depositors, but in most cases it is started by a general realization that systemically important financial institutions are in trouble.
The contagion effect was analyzed by Reinhart et al. (2010), who documented some connections between private and public debt cycles and sovereign debt crises and recurrent banking in the last two centuries.

2.1. Definition of Debt and Sovereign External Debt

Borrowing is an essential part of governments' budgets but can also turn into a major problem as a source of macroeconomic imbalances that result in crisis or default. Koh et al. (2020) analyzed the situation of emerging markets and developing economies that encountered debt accumulation resulting in periods of crisis. They find that the episodes of debt acceleration are reciprocal, and that almost half of the episodes are related to financial crises. A larger share of short-term external debt is shown to lead to lower reserve coverage and higher debt service. The decision to borrow and repay debt as a source for the budget is an important process for governments. It is important for both lenders and borrowers for all types of countries, as it is an alternative source for governments in addition to domestic resources. This process was investigated by Eaton (1995), who noted that repayment is often diversified and comprises delayed renegotiation, public intervention, and default. The decision between default or repayment is important for all parties to the process. The rules that apply in the debt restructuring process are important for both debtor and borrower countries. Müller et al. (2016) analyze the impact of three interacting

frictions on the relationship between government debt and structural reforms. The frictions are defined as incomplete markets, limited commitment, and limited implementation. The study concludes that a country in recession issues debt to smooth consumption and launches reforms to accelerate recovery. Debt is renegotiated when the sovereign has difficulties with costs. As Müller et al. (2016) note, consumption smoothing, and reforms are associated with recovery. Malluci (2014) argues that default has some effects on output. They conclude that default endogenously explains the output contraction. Subsequently, default lowers investors' balance sheets and causes a contraction in the supply of credit to the private sector. Therefore, the rule of domestic holding of government debt is a disciplinary tool and reduces the government's incentives to default.

In addition to prior studies, the banking sector relation of sovereign default is analyzed by Sosa Padilla (2017). The banking sector and sovereign default interactions are analyzed in the study. The research focuses on this link by enhancing the classical sovereign default framework to include bankers with high exposure to sovereign debt; default triggers a banking crisis, which in turn leads to a fall in corporate lending and reduced output.

2.1.1. Descriptive Analysis of Crisis

In this part of the study, it is aimed to show and analyze the ratio of each crisis for every type of country during the analyzed period.

In the analysis, the crisis definitions are the same as Reinhart et al. (2000) and Reinhart (2021) and the global crisis data from Reinhart and Kaminsky (2008). The crisis data set is obtained from Reinhart and Kaminsky online date resources.[1] Following the crises definitions in these sources, in this study the crises are analyzed under the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default and sovereign external debt. These crises are analyzed for the 25-year time periods between the years from the beginning of 1800s to 2016 annually for the following country groups: all countries, advanced countries, developing countries, emerging countries, financial centers and non-financial centers. These groups are

constructed to analyze various types of groups to make a comparison between the frequencies of the different types of crises for the different types of country groups. The following table gives the country list name and country list.

Table 3. Country groups and included countries.

Country Name	Country List
All Country Group	Argentina, Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Czechia, Denmark, Dominican Republic, Ecuador, Egypt, Arab Rep, El Salvador, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Indonesia, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Norway, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkiye, Uganda, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Slovak Republic, Slovenia, South Africa, Switzerland.
Financial Centers	Belgium, Ireland, Netherlands, Switzerland, United Kingdom
Non-Financial Centers	Argentina, Australia, Austria, Bahrain, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Czechia, Denmark, Dominican Republic, Ecuador, Egypt, Arab Rep, El Salvador, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Indonesia, Iraq, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Malaysia, Mexico, Morocco, New Zealand, Norway, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Thailand, Turkiye, Uganda, United Arab Emirates, United States, Uruguay, Venezuela, Vietnam, Slovak Republic, Slovenia, South Africa, Switzerland.
Advanced Countries	Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Italy, Japan, New Zealand, Norway, Portugal, Spain, Sweden, United States,
Developing Countries	Dominican Republic, Ecuador, El Salvador, Latvia, Uruguay, Venezuela RB
Emerging Countries	Argentina, Bahrain, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czechia, Egypt, Arap Rep, Estonia, Hungary, Indonesia, Israel, Korea, Latvia, Lithuania, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, South Africa, Thailand, Turkiye

The data set is collected from Kaminsky and Reinhart online data sources, which analyze the crises basically in six main categories: banking crisis, systematic crisis,

currency crisis, inflation crisis, domestic debt in default, and sovereign external debt.[1] The country set is constructed depending on fundamental data availability. In the first step, we made the crisis analysis estimate for Financial Center (FC) and all samples. Then, we grouped the whole sample countries as advanced, emerging markets, and developing economies according to Morgan Stanley Capital International Index.

The crisis data yearly covering 1800 up to 2016 classify the crisis into 6 main categories: banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt. The country set includes 64 countries, and these countries are classified depending on MSCI Country Classification into 6 main categories: all countries, financial centers, non-financial centers, advanced economies, emerging market economies and developing economies.

In this part of the study, we estimate some descriptive statistics for crises for our groups of countries. The analysis aims to report frequencies of different types of crises, in the analyzed period. Tables 4, 5, 6, 7, 8, and 9 show descriptive statistics for all countries, developing countries, advanced countries, emerging countries, non-financial centers, and financial centers to analyze the probability of banking crises, systematic crises, currency crises, inflation crises, domestic debt default, and sovereign external default. The analyzed period includes the years between 1800 and 2016.

While doing the analysis, inspiration for the length of the time period decision came from data indicator of World Bank data source. World Bank data source allows to obtain the historical data with the 5s, 10s, 15s, 20s, 25s and 50s sub-year period for all indicators. While deciding on the period of the analysis, it is taken into consideration that the analyzed period involves milestone events for instance, industrial revolution that begins from the beginning of 1800s till 1900s, First World War that starts in 1914 and continued up to 1918, Great Depression that broke out in 1929, Second World War began in 1939 and ended in 1945, First Oil Crisis

[1] The online data source is collected from Carmen Reinhart (with her coauthors Ken Rogoff, Christoph Trebesch, and Vincent Reinhart)
https://www.hbs.edu/behavioral-finance-and-financial-stability/data/Pages/global.aspx

happened in 1973, Second Oil Crisis happened in 1979, Great Recession burst out in 2008. These milestone events had global impacts on countries' international perspective that's why, in this study it is aimed to analyze the landmark cases in solely in their period. Because of this, the period between 1800 and 2016 was divided into 25 years sub-periods to analyze the milestone events separately.

This period is separated into 9 main subperiods that span between the years: 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016. In addition to separated 25-year groups, the last group of the analysis includes the years between 1800 and 2016. Initially, the analysis is done for all countries, then it is done for the other 5 groups of countries.

Table 4 presents descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt in all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

Table 4. Descriptive Statistics: Ratio of Crises Years observed for All Countries.

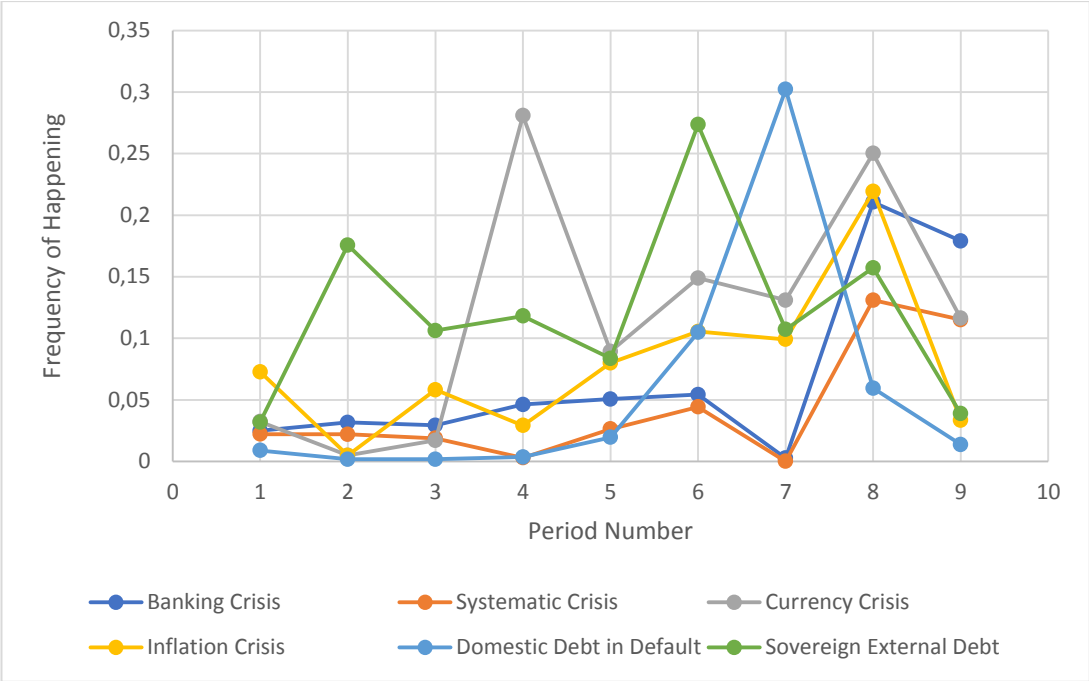
All Countries										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
Banking Crisis	0.0248 (1,125)	0.0316 (1,125)	0.0293 (1,125)	0.0462 (1,125)	0.0506 (1,125)	0.0542 (1,125)	0.00266 (1,125)	0.2106 (1,125)	0.179 (670)	0.0649 (9,670)
Systematic Crisis	0.0221 (1,172)	0.0220 (1,175)	0.0187 (1,175)	0.00288 (1,175)	0.0263 (1,175)	0.04425 (1,175)	0 (1,175)	0.1310 (1,175)	0.1151 (764)	0.0426 (10,161)
Currency Crisis	0.0323 (1,175)	0.00491 (1,175)	0.0170 (1,175)	0.02808 (1,175)	0.0893 (1,175)	0.1489 (1,175)	0.1310 (1,175)	0.2502 (1,175)	0.1163 (799)	0.0899 (10,199)
Inflation Crisis	0.0727 (1,100)	0.00491 (1,100)	0.0581 (1,100)	0.02909 (1,100)	0.08 (1,100)	0.1054 (1,100)	0.09909 (1,175)	0.2192 (1,140)	0.0335 (775)	0,0858 (9,615)
Domestic Debt in Default	0.0089 (1, 122)	0.0017 (1,125)	0.0017 (1,125)	0.00355 (1,125)	0.01955 (1,125)	0.1048 (1,125)	0.3022 (1,125)	0.0595 (1,125)	0.0137 (726)	0.0265 (9,723)
Sovereign External Debt	0,0319 (1,097)	0.1756 (1,100)	0.1063 (1,100)	0.1181 (1,100)	0.0836 (1,100)	0.2736 (1,100)	0.1072 (1,100)	0.1572 (1,100)	0 .03877 (748)	0.1244 (9,545)

Source: Authors calculation. The parenthesis presents the number of observations for the analyzed period.

Table 4 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for all the

countries under analysis during the 1800 - 2016 period. The ratio of happening for each type of crisis for all countries follows increasing and decreasing paths from 1800 to 2016. For the whole countries, the ratio of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.2106 for the period between 1975 and 1999, which is higher than the average of the whole analysis period, 0.0649 during the 1800 - 2016 period. The ratio of systematic crisis also floats during the period 1800 - 2016 with an average of 0.0426 and it reaches its peak level, 0.1310 for 1975 - 1999. The frequency of currency crisis follows a similar path and has an average of 0.0899 for the 1800 - 2016 period, the ratio reaches its highest level of 0.2502 for 1975 - 1999. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.0858 for the 1800 - 2016 period, the ratio reaches its highest level in the 1975 - 1999 period, similar to the other types of crises. The ratio of domestic debt in default shows a volatile change with an average of 0.0265 during the 1800 - 2016 period and it reaches its highest level with the value of 0.3022 for the 1950 – 1974 period. The ratio of sovereign external debt fluctuates during the 1800 - 2016 period with an average of 0.1244 and it reaches its highest level of 0.2736 during the 1925 - 1949 period. For all countries, during the 1800 - 2016 period, the domestic debt in default has the lowest frequency of happening, conversely, sovereign external debt has the highest frequency of appearing.

For all countries, for the years between 1800 and 2016, the frequency of the banking crisis follows a floating path and ends up with a higher frequency than its beginning frequency. The frequency of inflation crisis follows a path that shows sharp variation and finishes with a frequency, which is lower than the starting frequency. Systematic crisis frequency keeps up fluctuating frequency through analyzed period but ends up with a frequency that is much higher than the beginning frequency. The frequency of domestic debt in default shows minor variation until 5^{th} period, then it starts to rise till 7^{th} period, and finally it falls till nearly its beginning frequency. Currency crisis frequency shows extremely fluctuating frequency variation, ends up with a higher frequency than beginning frequency. Despite the frequency of sovereign external debt follows a fluctuating path, ends up nearly with the same frequency in the beginning.



Source: Authors calculation.

Figure 1. Descriptive Statistics: Ratio of Crises Years observed for All Countries.

Table 5 presents descriptive statistics for all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1920 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

Table 5. Descriptive Statistics: Ratio of Crises Years observed for Developing Countries.

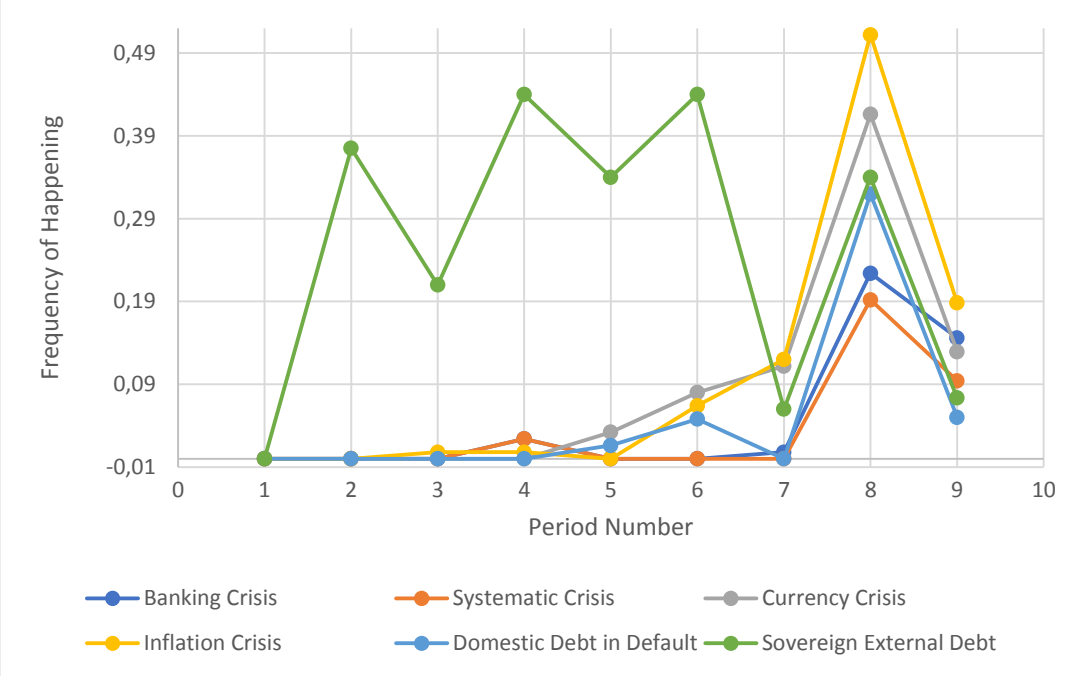
Developing Countries										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
Banking Crisis	0 (125)	0 (130)	0 (125)	0.024 (125)	0 (125)	0 (125)	0.008 (125)	0.224 (125)	0.146 (75)	0.04 (1,075)
Systematic Crisis	0 (125)	0 (130)	0 (125)	0.024 (125)	0 (125)	0 (125)	0 (125)	0.192 (125)	0.0941 (85)	0.0322 (1,075)
Currency Crisis	0 (125)	0 (130)	0 (125)	0 (125)	0.032 (125)	0.08 (125)	0.112 (125)	0.416 (125)	0.1294 (85)	0.0083 (1,085)
Inflation Crisis	0 (125)	0 (130)	0.008 (125)	0.008 (125)	0 (125)	0.064 (125)	.12 (125)	0.512 (125)	0.1882 (85)	0.0967 (1,085)
Domestic Debt in Default	0 (125)	0 (130)	0 (125)	0 (125)	0.016 (125)	0.048 (125)	0 (125)	0.32 (125)	0.05 (80)	0.0481 (1,080)
Sovereign External Debt	0 (100)	0.375 (104)	0.21 (100)	0.44 (100)	0.34 (100)	0.44 (100)	0.06 (100)	0.34 (100)	0.0735 (68)	0.2603 (868)

Source: Authors calculation. The parentheses present the number of observations for the analyzed period.

Table 5 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for the developing countries under analysis during the 1800 - 2016 period. The frequency of happening for each type of crisis for all countries follows rising and falling paths from 1800 to 2016. Because of the data restrictions, there are some omitted values in the estimations in the table. The results are interpreted depending on the observable data. For developing countries, the frequency of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.224 for the 1975 – 1999 period, which is higher than the average of the whole analysis period, 0.04 during the 1800 - 2016 period. The ratio of systematic crisis also floats during the 1800 - 2016 period with an average of 0.0322 and it reaches its peak level, 0.192 for the 1975 – 1999 period. The frequency of currency crisis follows a similar path and has an average of 0.0838 for the 1800 - 2016 period, the ratio reaches its highest level of 0.416 for the 1975 - 1999 period. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.0967 for the 1800 - 2016 period, the ratio reaches its highest level of 0.512 in the 1975 - 1999 period, similar to the other types of crises. The ratio of domestic debt in default shows a volatile change with an average of 0.0481 during the 1800 - 2016 period and it reaches its highest level with the value of 0.32 for the 1950 – 1974 period. The ratio of sovereign external debt fluctuates during the 1800 - 2016 period with an average of 0.2603 and it reaches its highest level of 0.44 during the periods 1875 - 1899 and 1925 - 1949. For developing countries, during the 1800 - 2016 period, the systematic crisis has the lowest frequency of happening, conversely, sovereign external debt has the highest frequency of appearing among all other crises.

For developing countries for the years between 1800 and 2016, the frequency of the banking crisis follows a steady path till 7^{th} period and then the frequency fluctuation ends ups with a higher frequency than the beginning frequency. Inflation crisis shows a steady frequency till 7^{th} period and floats until the end of overall period and finishes up with a higher frequency than the starting frequency. Systematic crisis frequency shows a steady a frequency through analyzed period and then end up with a frequency that is higher than the starting frequency. The frequency of domestic debt in default shows minor until 7^{th} period and then it finishes with a frequency

higher than the starting point. Currency crisis frequency presents a smooth frequency till 5th period and then increases till 7th period, ends up with a frequency that is higher than the beginning frequency. For developing countries, sovereign external debt followed extremely volatile path through the analyzed duration and then it ends up with a frequency that is higher than the beginning frequency.



Source: Authors calculation.

Figure 2. Descriptive Statistics: Ratio of Crises Years observed for Developing Countries.

Table 6 presents descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt in all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

Table 6 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for the advanced countries under analysis during the 1800 - 2016 period. The frequency of happening for each type of crisis for all countries follows increasing and decreasing

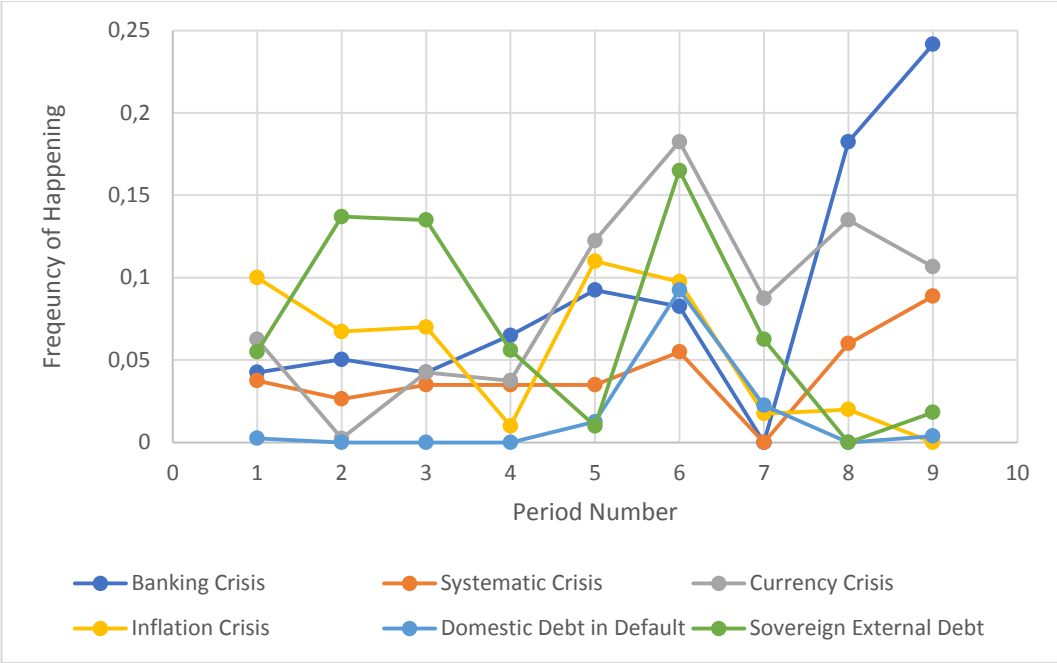
paths from 1800 to 2016. There are some omitted values in the data, the estimations and interpretations are done according to the availability of the data.

Table 6. Descriptive Statistics: Ratio of Crises Years observed for Advanced Countries

Advanced Countries										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
Banking Crisis	0.0425 (400)	0.0504 (416)	0.0425 (400)	0.065 (400)	0.0925 (400)	0.0825 (400)	0 (400)	0.1825 (400)	0.2416 (240)	0.0819 (3,440)
Systematic Crisis	0.0375 (399)	0.0264 (416)	0.035 (400)	0.035 (400)	0.035 (400)	0.055 (400)	0 (400)	0.06 (400)	0.0888 (259)	0.0396 (3,458)
Currency Crisis	0.0625 (400)	0.0024 (416)	0.0425 (400)	0.0375 (400)	0.1225 (400)	0.1825 (400)	0.0875 (400)	0.135 (400)	0.1066 (272)	0,0855 (3,472)
Inflation Crisis	0.1 (400)	0.0673 (416)	0.07 (400)	0.01 (400)	0.11 (400)	0.0975 (400)	0.0175 (400)	0.02 (400)	0 (268)	0,0568 (3,468)
Domestic Debt in Default	0.0025 (399)	0 (416)	0 (400)	0 (400)	0.0125 (400)	0.0925 (400)	0.0225 (400)	0 (400)	0.0039 (256)	0,0153 (3,455)
Sovereign External Debt	0.0551 (399)	0.1370 (416)	0.135 (400)	0.056 (400)	0.01 (400)	0.165 (400)	0.0625 (400)	0 (400)	0.0183 (272)	0,0723 (3,471)

Source: Authors calculation. The parentheses present the number of observations for analyzed period

For the advanced countries, the frequency of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.2416 for the 2000 - 2016 period, which is higher than the average of the whole analysis period, 0.0819 during the 1800 - 2016 period. The ratio of systematic crisis also floats during the 1800 - 2016 period with an average of 0.0396 and it reaches its peak level, 0.0888 for the 2000 - 2016 period. The frequency of currency crisis follows a similar path and has an average of 0.0855 for the 1800 - 2016 period, the ratio reaches its highest level of 0.8854 for the 1975 - 1999 period. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.0568 for the 1800 - 2016 period, the ratio reaches its highest level, 0.11 in the 1900 - 1924 period. The ratio of domestic debt in default shows a volatile change with an average of 0.0153 during the 1800 - 2016 period and it reaches its highest level with the value of 0.0925 for the 1925 - 1949 period. The ratio of sovereign external debt fluctuates during the 1800 – 2016 period with an average of 0.0723 and it reaches its highest level of 0.165 during the 1925 - 1949 period. For advanced countries, during the 1800 - 2016 period, the domestic debt in default has the lowest frequency of happening, conversely, currency crisis has the highest frequency of appearing.



Source: Authors calculation.

Figure 3. Descriptive Statistics: Ratio of Crises Years observed for Advanced Countries

For advanced countries, through the years between 1800 and 2016, the frequency of the banking crisis follows fluctuating path during the analyzed period and ends up with a frequency which is 5 times of the beginning frequency. Inflation crisis follows periodic-like path which follows downward progress until period 5, and it reaches another peak to follow a similar downward path by ending up with a frequency that is lower than the beginning of the analysis period. Systematic crisis frequency shows minor variation through the analyzed period and finishes the period with a frequency that is higher than the beginning of the period. The frequency of the domestic debt in default shows only a peak about the middle of the analyzed period then ends up with a frequency that is nearly similar with the beginning of the period. Currency crisis followed a fluctuating path both downward and upward through the analyzed period, it ends up with a frequency that is higher than the beginning frequency. Similar to the other country groups, sovereign external debt follows extremely fluctuating path through the analyzed period, and it ends up with a frequency that is lower than the beginning frequency.

Table 7 presents descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt

in all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

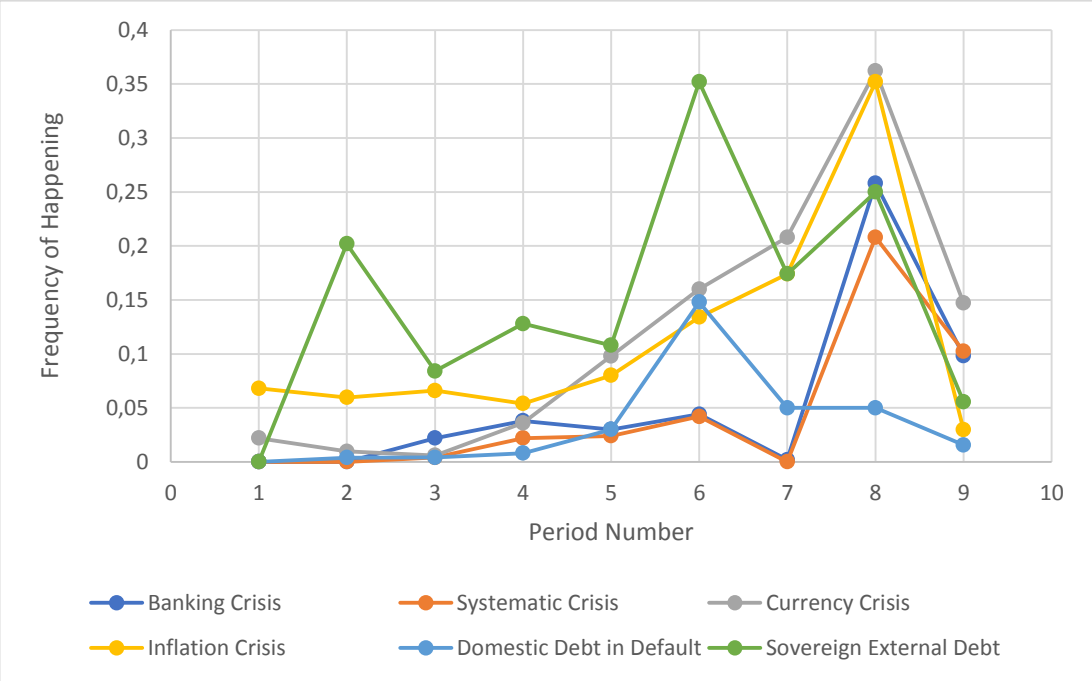
Table 7. Descriptive Statistics: Ratio of Crises Years observed for Emerging Countries

Emerging Countries										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
Banking Crisis	0 (500)	0 (520)	0.022 (500)	0.038 (500)	0.03 (500)	0.044 (500)	0.002 (500)	0.258 (500)	0.0983 (295)	0.0526 (4,295)
Systematic Crisis	0 (498)	0 (520)	0.004 (500)	0.022 (500)	0.024 (500)	0.042 (500)	0 (500)	0.208 (500)	0.1024 (322)	0.0423 (4,320)
Currency Crisis	0.022 (500)	0.0096 (520)	0.006 (500)	0.036 (500)	0.098 (500)	0.16 (500)	0.208 (500)	0.362 (500)	0.147 (340)	0.1154 (4,340)
Inflation Crisis	0.068 (500)	0.05961 (520)	0.066 (500)	0.054 (500)	0.08 (500)	0.134 (500)	0.174 (500)	0.352 (500)	0.0296 (337)	0.0116 (4.337)
Domestic Debt in Default	0 (498)	0.0038 (520)	0.004 (500)	0.008 (500)	0.03 (500)	0.148 (500)	0.05 (500)	0.05 (500)	0.0156 (320)	0.0347 (4.318)
Sovereign External Debt	0 (498)	0.2019 (520)	0.084 (500)	0.128 (500)	0.108 (500)	0.352 (500)	0.174 (500)	0.25 (500)	0.05558 (340)	0.1542 (4.338)

Source: Authors calculation. The parentheses present the number of observations for the analyzed period.

Table 4 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for the emerging countries under analysis during the 1800 - 2016 period. The frequency of happening for each type of crisis for all countries follows rising and falling paths from 1800 to 2016. There are some omitted values in the data, the estimations and interpretations are done according to the availability of the data. For the emerging countries, the frequency of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.258 for the 1975 - 1999 period, which is higher than the average of the whole analysis period, 0.0526 during the 1800 - 2016 period. The ratio of systematic crisis also floats during the 1800 -2016 period with an average of 0.0423 and it reaches its peak level, 0.4788 for the 1800 - 1824 period. The probability of currency crisis follows a similar path and has an average of 0.1154 for the 1800 - 2016 period, the ratio reaches its highest level of 0.362 for the 1975 - 1999 period. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.1162 for the 1800 - 2016 period, the ratio reaches

its highest level, 0.352 in the 1975 - 1999 period. The ratio of domestic debt in default shows a volatile change with an average of 0.0347 during the 1800 - 2016 period and it reaches its highest level with the value of 0.148 for the 1925 – 1949 period. The ratio of sovereign external debt fluctuates during the 1800 - 2016 period with an average of 0.1542 and it reaches its highest level of 0.352 during the 1925 - 1949 period. For emerging countries, during the 1800 - 2016 period, the domestic debt in default has the lowest frequency of happening, conversely, sovereign external debt has the highest frequency of appearing among the others.



Source: Authors calculation.

Figure 4. Descriptive Statistics: Ratio of Crises Years observed for Emerging Countries

For emerging countries, through the years between 1800 and 2016, the frequency of the banking crises shows small variation except the dip and peak at the 7th and 8th period respectively, then finishes with a frequency that is higher than the starting frequency. Inflation crisis shows a steady trend till 4th period, which is followed by a rising trend till 8th period, and in the final period it falls and ends up with a frequency that is lower than the beginning frequency. Systematic crisis shows small variation through the analyzed period and then ends up with a frequency that is higher than the starting frequency. Domestic debt in default that shows a minor fluctuation through

the analyzed period and finishes the analyzed period with a frequency, which is slightly higher than the beginning frequency. Currency crisis follows a rising path through the analyzed period except the last period and reaches the final period with a higher frequency than the beginning frequency. While sovereign external debt shows ups and downs in each analyzed period, it ends up with a frequency slightly higher than the beginning frequency.

Table 8 presents descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt in all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

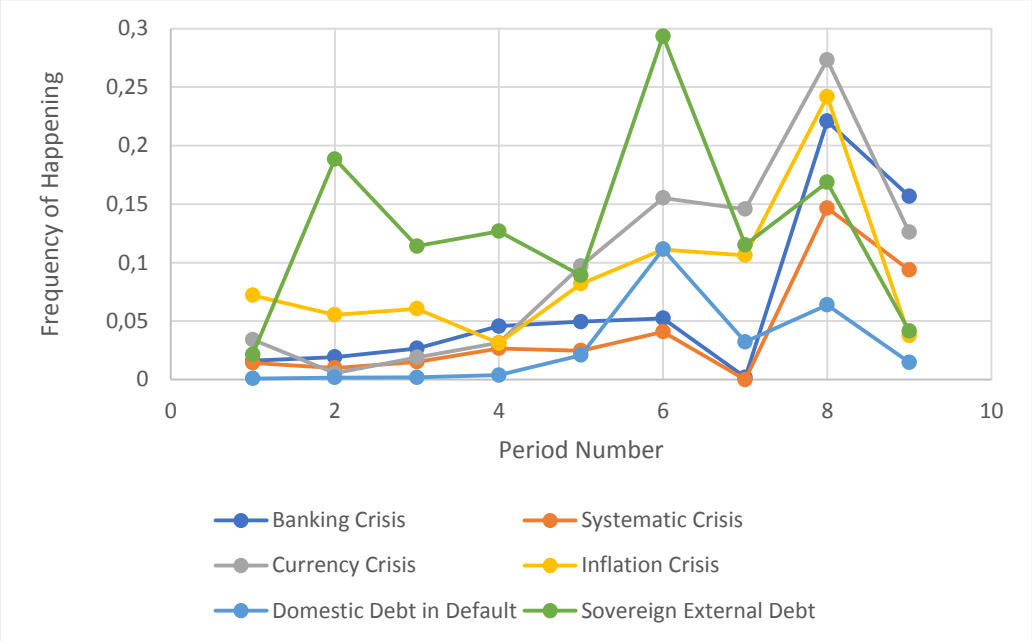
Table 8. Descriptive Statistics: Ratio of Crises Years observed for Non-financial Centers.

Non-Financial Countries										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
Banking Crisis	0.0161 (1,050)	0.0192 (1,092)	0.0266 (1,050)	0.0457 (1,050)	0.0495 (1,050)	0.0523 (1,050)	0.0019 (1,050)	0.2209 (1,050)	0.1568 (625)	0.0612 (9,025)
Systematic Crisis	0,0143 (1,047)	0.0100 (1,092)	0.0152 (1,050)	0.0266 (1,050)	0.0247 (1,050)	0.0409 (1,050)	0(1050 (1,050)	0.1466 (1,050)	0.0937 (683)	0.0393 (9,080)
Currency Crisis	0,0342 (1,050)	0.0054 (1,092)	0.0190 (1,050)	0.0314 (1,050)	0.0971 (1,050)	0.1552 (1,050)	0.1457 (1,050)	0.2733 (1,050)	0.126 (714)	0.0975 (9,114)
Inflation Crisis	0,0721 (1,025)	0.0553 (1,066)	0.0606 (1,025)	0.0312 (1,025)	0.0819 (1,025)	0.1112 (1,025)	0.1063 (1.025)	0.2419 (1,025)	0.0376(690)	0.0906 (8,890)
Domestic Debt in Default	0,0009 (1,047)	0.0018 (1,092)	0.0019 (1,050)	0.0038 (1,050)	0.0209 (1,050)	0.1114 (1,050)	0.0323 (1,050)	0.0638 (1,050)	0.0148 (672)	0.0283 (9,069)
Sovereign External Debt	0,02152 (1,022)	0.1885 (1,066)	0.1141 (1,025)	0.1268 (1,025)	0.089 (1,025)	0.2936 (1,025)	0.1151 (1,025)	0.1687 (1,025)	0.0416 (697)	0.1321 (8,894)

Source: Authors calculation. The parentheses present the number of observations for the analyzed period.

Table 8 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for the non-financial countries under analysis during the 1800 - 2016 period. The ratio of happening for each type of crisis for all countries follows increasing and decreasing paths from 1800 to 2016. There are some omitted values in the data, the estimations and interpretations are done according to the availability of the data. For the non-financial countries, the ratio of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.2209 for the 1975 - 1999 period,

which is higher than the average of the whole analysis period, 0.0612 during the 1800 – 2016 period. The ratio of systematic crisis also floats during the 1800 - 2016 period with an average of 0.0393 and it reaches its peak level, 0.1466 for the 1975 - 1999 period. The probability of currency crisis follows a similar path and has an average of 0.0975 for the 1800 - 2016 period, the ratio reaches its highest level of 0.2733 for the 1975 - 1999 period. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.0906 for the 1800 - 2016 period, the ratio reaches its highest level, 0.2419 in the 1975 - 1999 period. The ratio of domestic debt in default shows a volatile change with an average of 0.0283 during the 1800 - 2016 period and it reaches its highest level with the value of 0.0638 for the 1975 – 1999 period. The ratio of sovereign external debt fluctuates during the 1800 - 2016 period with an average of 0.1321, and it reaches its highest level of 0.2936 during the 1925 - 1949 period. For financial centers, during the 1800 - 2016 period, domestic debt in default has the lowest ratio of happening, conversely, sovereign external debt has the highest ratio of appearing among the others.



Source: Authors calculation.

Figure 5. Descriptive Statistics: Ratio of Crises Years observed for Non-Financial Centers

For non-financial countries, through the years between 1800 and 2016, the frequency of the banking crises shows fluctuating pattern through the analyzed period and ends

up with a frequency that is higher than the beginning frequency. While inflation crisis shows fluctuations through the analyzed period, it ends up with a frequency lower than the beginning. The systematic crisis follows a smooth path till 7th period, and it reaches a peak in 8th period and then ends up with a frequency that is higher than the beginning. The frequency of domestic debt in default is low in the first 4 periods; it increases a bit and shows minor variation through the following periods and ends up with a frequency that is higher than the starting period frequency. Currency crises frequency has volatile changes through the analyzed period and then reaches a frequency that is higher than the starting frequency. Sovereign external debt shows extreme changes in the frequency, but it ends up with nearly the same frequency with the beginning period.

Table 9 presents descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt in all countries during the subperiods of 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999; the last period observes time between 2000 and 2016.

Table 9. Descriptive Statistics: Ratio of Crises Years observed for Financial Centers

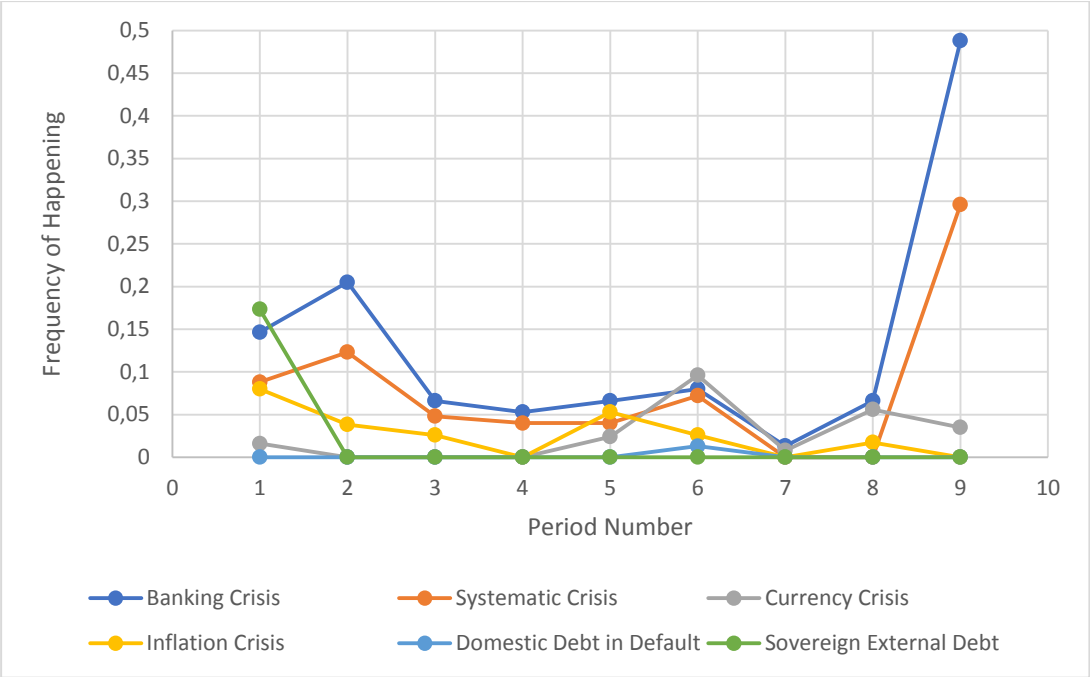
Financial Centers										
	1800-1824 (Period1)	1825-1849 (Period2)	1850-1874 (Period3)	1875-1899 (Period4)	1900-1924 (Period5)	1925-1949 (Period6)	1950-1974 (Period7)	1975-1999 (Period8)	2000-2016 (Period9)	1800-2016 (Period average)
27_Banking Crisis	0.1466 (75)	0.2051 (78)	0.066 (75)	0.053(75)	0.066(75)	0.08 (75)	0.0133 (75)	0.066 (75)	0.488 (45)	0.1162 (645)
28_Systematic Crisis	0.088 (125)	0.1230 (130)	0.048 (125)	0.04 (125)	0.04(125)	0.072 (125)	0 (125)	0 (125)	0.296 (81)	0.0703 (1.081)
30-Currency Crisis	0.016 (125)	0 (130)	0 (125)	0 (125)	0.024(125)	0.096 (125)	0.008 (125)	0.056 (125)	0.035 (85)	0.0258 (1.085)
31-Inflation Crisis	0.08 (75)	0.0384 (780	0.026 (75)	0 (75)	0.053(75)	0.026 (75)	0 (75)	0.0173 (115)	0 (85)	0.0262 (725)
45-Domestic Debt in Default	0 (75)	0 (78)	0 (75)	0 (75)	0(75)	0.013 (75)	0 (75)	0 (75)	0 (54)	0.0015 (654)
46-Sovereign External Debt	0.1733 (75)	0 (78)	0 (75)	0 (75)	0(75)	0 (75)	0(75)	0(75)	0 (51)	0.0199 (651)

Source: Authors calculation The parenthesis presents the number of observations for the analyzed period

Table 9 reports descriptive statistics for the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt for the

financial countries under analysis during the 1800 - 2016 period. The frequency of happening for each type of crisis for all countries follows rising and falling paths from 1800 to 2016. There are some omitted values in the data, the estimations and interpretations are done according to the availability of the data. For the financial countries, the frequency of banking crisis fluctuates during the analysis period, and it reaches the highest rate of happening, 0.488 for the 2000 - 2016 period, which is higher than the average of the whole analysis period, 0.1162 during the 1800 – 2016 period. The ratio of systematic crisis also floats during the 1800 - 2016 period with an average of 0.0703 and it reaches its peak level, 0.296 for the 2000 - 2016 period. The frequency of currency crisis follows a similar path and has an average of 0.0258 for the 1800 - 2016 period, the ratio reaches its highest level of 0.096 for the 1925 - 1949 period. Also, the rate of inflation crisis shows volatile changes for the analysis period with a mean of 0.0262 for the 1800 - 2016 period, the ratio reaches its highest level, 0.053 in the 1900 - 1924 period. The ratio of domestic debt in default shows a volatile change with an average of 0.0015 during the 1800 - 2016 period and it reaches its highest level with the value of 0.013 for the 1925 - 1949 period. The ratio of sovereign external debt is not calculated because of the omitted values. For financial centers, during the 1800 - 2016 period, the domestic debt in default has the lowest frequency of happening, conversely, banking crisis has the highest frequency of appearing among the others.

For financial centers, through the years between 1800 and 2016, the frequency of the banking crises follows rather a steady but decreasing path till 7^{th} period in general, then starts to increase and then ends up with a frequency that is higher than its initial frequency. Inflation crisis follows a steady path and ends up a frequency that is lower than its initial frequency. Systematic crisis shows a smooth frequency and then ends up with a frequency that is higher than its initial frequency. Domestic debt in default frequency follows a smooth path and finishes with a similar frequency to beginning. Currency crisis frequency shows smooth path till 4^{th} period, and after this period it starts to increase, then ends up with a frequency that is higher than its initial frequency. Different from the initial cases of crisis, sovereign external debt shows a falling path and ends up a frequency that is lower than its initial frequency.



Source: Authors calculation.

Figure 6. Descriptive Statistics: Ratio of Crises Years observed for Financial Centers

Depending on the overall results, In Table 4, for all countries, during the 1800 - 2016 period, the domestic debt in default is the least frequent type of crises, conversely, sovereign external debt is the most frequent type of crises appearing. In Table 5, for developing countries, during the 1800 - 2016 period, the systematic crisis is the least frequent type of crises, conversely, sovereign external debt is the most frequent type of crises of appearing among all other crises. In Table 6, for advanced countries, during the 1800 - 2016 period, the domestic debt in default is the least frequent type of crises lowest probability of happening, conversely, currency crisis is the most frequent type of crises of appearing. In Table 7, for emerging countries, during the 1800 - 2016 period, the domestic debt in default is least frequent type of crises happening, conversely, currency crisis is the most frequent type of crises appearing among the others. In Table 8, for non-financial centers, during the 1800 - 2016 period, the domestic debt in default is the least frequent type of crises of happening, conversely, sovereign external debt has the most frequent type of crises of appearing among the others. In Table 9, for financial centers, during the 1800 - 2016 period, the domestic debt in default is the least frequent type of crises of happening, conversely, banking crisis is the most frequent type of crises of appearing among the others.

2.2. Main Findings

Economic crises have increased in recent centuries. During this period many countries suffered from the crisis and developed a policy to overcome its impacts. While making any alternative policy tools for the countries, it is necessary to have an idea about the countries' crisis history. In this part, we analyze crises utilizing the data set obtained from Kaminsky and Reinhart's online data sources. The definition of crisis follows an approach similar to Kaminsky and Reinhart's online sources. For the analysis of descriptive statistics, we analyze the probability of an outbreak of the crisis in the period of 1800 and 2016 and the following subperiods: 1800 and 1824, 1825 and 1849, 1850 and 1874, 1875 and 1899, 1900 and 1924, 1925 and 1949, 1950 and 1974, 1975 and 1999, 2000 and 2016; for different country groups: financial centers, non-financial centers, advanced economies, emerging economies, and developing economies.

As a result of this analysis, it is stated that sovereign external debt is the most observed type of crisis among the researched groups depending on the whole period average for all countries, developing, emerging, and nonfinancial countries. On the other hand, for advanced countries: currency crises are the most seen type of crisis, and for financial centers: banking crises are the most seen type of crisis. The probability of happening for any type of crisis follows a rising and falling path during the analyzed period.

As a general estimation result, it can be reported that the banking crisis and the systematic crisis have the highest probability of happening for financial centers; currency crisis and inflation crisis have the highest probability of happening in emerging market economies; domestic debt in default and sovereign external debt in default have the highest probability of happening for developing countries considering the average during the period 1800 and 2016.

When we investigate the circumstances of the sub-periods, in the case of making a comparison with the perspective of the crises side; initially, between 1800 and 1824, banking crises are seen with the highest probability in financial centers, systematic crises happen with the highest probability in advanced economies, and currency

crises are seen with the highest possibility in advanced economies. Inflation crises and sovereign external debt in default are seen with the highest possibility in financial centers. Domestic debt in default crisis happens with the highest probability in all countries. In the case of evaluating from the perspective of country classification for the same period, all, advanced, EMEs and nonfinancial centers groups have experienced inflation crises with the highest probability. On the other hand, financial centers experienced sovereign external debt default with the greatest probability.

The following subgroup is the period between 1825 and 1849 when banking and systematic crises are seen in financial centers with the highest probability. Currency crises happened with the highest probability in advanced economies. Inflation crises were seen with the highest probability in emerging market economies. The domestic debt in default had burst out with the highest probability in nonfinancial centers. On the other hand, sovereign debt in default happened with the highest possibility in developing countries. When an assessment is made with the approach of country classification for the same periods, for the country groups of all, developing, advanced countries, and emerging market economies experienced sovereign external debt with the highest probability. On the other hand, non-financial centers experience domestic debt in default, and financial centers experienced banking crises with the greatest probability.

Yet another sub-group is the period of 1850 and 1874, similarly to the previous period, banking crises and systematic crises happened with the highest probability in financial centers. On the other hand, currency crises and inflation crises were seen with the highest probability in advanced countries. Domestic debt in default was seen with the highest probability in emerging market economies. Sovereign debt in default was seen with the highest probability in the developing country group. In the case of presenting the conditions from the perspective of country classification for the same period, the country groups of all, developing, advanced, emerging market economies and non-financial centers experienced sovereign external debt in default with the highest probability. On the other hand, financial centers had banking crises with the highest probability.

The following subgroup is the period that spans the years between 1875 and 1899, when we evaluate from the perspective of crises, banking, systematic and currency crises were seen with the highest probability in advanced countries. On the other hand, inflation and domestic debt in default happened with the highest probability in emerging market economies. On the other hand, sovereign external debt in default was seen with the highest probability in developing countries.

For the given periods, assessment from the perspective of country groups, all, developing emerging market economies, and nonfinancial groups experienced sovereign external debt in default with the highest probability. Developing countries experienced systematic crises. On the other hand, advanced counties and financial centers had banking crises with the highest probability.

The sequent subgroup is the period that includes the years between 1900 and 1924. In the case of evaluating from the perspective of the crisis side, the highest probability of happening of banking, currency, and inflation crises was in the advanced countries group.

The systematic crisis was seen with the highest probability in financial centers. Domestic debt in default was seen with the highest probability in emerging market economies and sovereign external debt in default happened with the highest possibility in developing countries in the analyzed period. The analysis of country comparison is as follows, currency and inflation crises had a similar probability that had the highest magnitude for all-countries group.

The case relatively changed for developing, advanced, and non-financial countries groups that had currency crises with the greatest probability. On the other hand, emerging market economies experienced sovereign external debt default with the highest probability, and financial centers had banking crises with the greatest probability.

The following period consists of the years between 1925 and 1949, in the sense of crisis perspective, the banking crisis was seen with the greatest probability of

happening in both advanced countries and financial centers. On the other hand, the systematic crisis happened with the highest probability in financial centers. The currency crisis was seen with the highest probability in advanced countries. Inflation crises and Domestic debt in default came out in emerging market economies with the highest probability.

Sovereign external debt default happened with the highest probability in developing countries. The case when the analysis was done from the perspective of country groups, for all, developing, emerging market economies and non-financial groups sovereign external debt default had the highest probability of happening. On the other hand, for advanced countries and financial centers currency crises had the highest probability of happening.

The next term includes the years between 1950 and 1974 when banking crises were seen with the highest probability in financial centers. On the other hand, currency, inflation, and sovereign external debt default happened with the highest probability in emerging market economies. Domestic debt in default burst with the highest probability in the all-countries group.

The situation was as follows, in the case of evaluating country groups, domestic debt in default burst with the highest probability for all-countries group, and inflation crisis had the highest probability of happening for developing countries. On the other hand, the currency crisis was the most probable crisis for advanced countries, emerging market economies, and non-financial centers. The banking crisis had the greatest probability of happening for financial centers.

The consequent period was the years between 1975 and 1999 when banking and systematic crisis had the most seen crisis in emerging market economies. On the other hand, currency, inflation, domestic debt in default, and sovereign external debt in default happened with the highest probability in developing economies.

When the comparison is done depending on the country groups, the currency crisis was the most happening crisis for all, emerging market economies and non-financial

centers. For the developing country case, the inflation crisis had the highest probability of happening. The banking crisis had the greatest probability of happening for financial centers.

In the following period between the years 2000 and 2016, the banking and systematic crisis outbroke with the highest probability in financial centers. Then, currency crises happened with the highest probability in emerging market economies. On the other hand, inflation, domestic debt in default, and sovereign external debt in default had the highest level of probability in developing countries.

The country comparison perspective is done as follows, banking crisis had the highest probability of breaking in all countries, advanced countries, nonfinancial centers, and financial centers. In emerging market economies, currency crises had the greatest probability of happening. The inflation crisis had the highest probability of outbreaking in developing countries.

In the last step, the whole period that covers the years between 1800 and 2016 is summarized from a general perspective. Similar to many subperiods banking crises and systematic crises had the highest probability of happening in financial centers. In addition, currency and inflation crises had the greatest possibility of happening in emerging market economies. On the other hand, similar to the prior cases, domestic debt in default and sovereign external debt in default had the greatest level of happening in developing countries.

If the comparison is done according to country groups, for all countries, developing countries, emerging market economies, and non-financial centers sovereign external debt default had the greatest probability of breaking. On the other hand, for advanced countries banking crises and currency crises shared the greatest probability of bursting. For financial centers, the banking crisis was the crisis that happened with the highest probability of happening.

In this part, the crisis is separated into the banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt crisis.

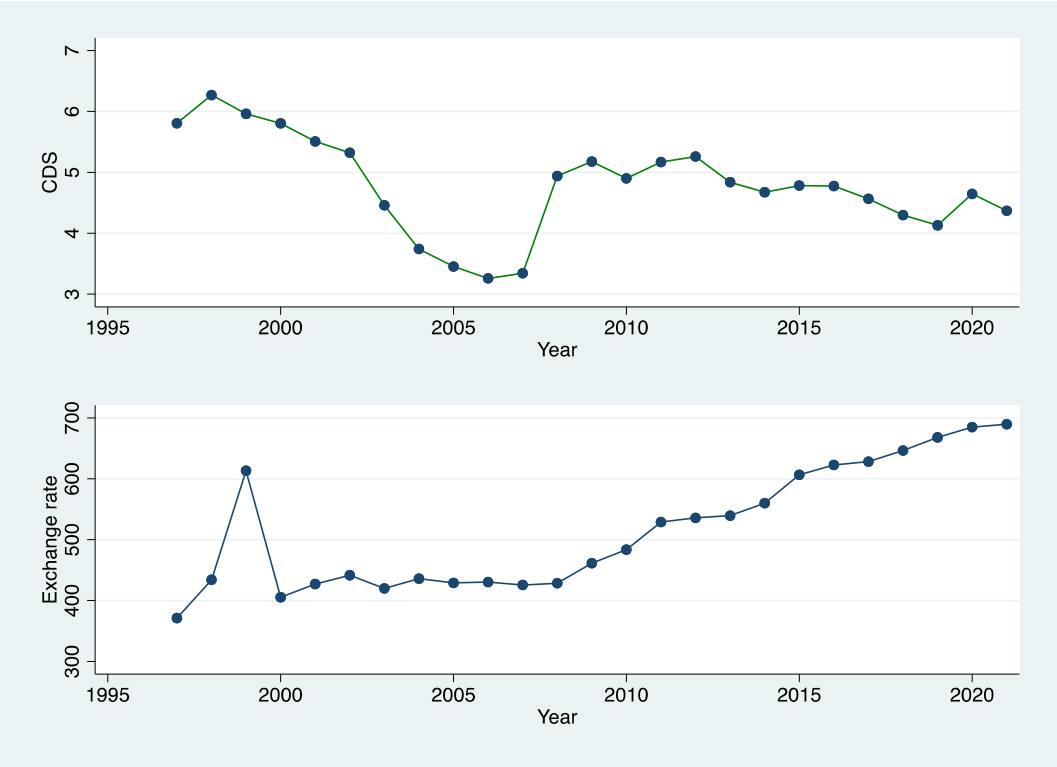
While all the crises are analyzed separately, Reinhart et al. (2008) indicate financial crises are distinct and they also have similarities. Because of this, solving one type of crisis also provides solutions for the other type of crisis. Although literature differentiates the crises with the definitions, it is not possible to separate them exactly from each other. According to historical data, the frequencies of crises show that sovereign external debt is the most seen type of crisis for analyzed countries, and it is necessary to indicate that in the recent decades, which covers the period after oil crisis, banking crisis, then currency crisis and after them, inflation crisis is the most frequent seen type of crisis for the analyzed countries. Since the crises cannot be separated from each other with very distinct definitions and sovereign external debt is most seen type of crisis, taking necessary precautions for preventing sovereign external debt will help in solving the other type of crisis at the same time with the analyzed crisis. This conclusion supports the research on finding the determinant factors of sovereign external debt crisis and also the research on the factors which affect the risk of sovereign external debt.

2.3. The Relation Analysis between CDS and Exchange Rate

In this part of the research, we will analyze the changes in the value of Credit Default Swap spread 5- and Exchange Rate for the period between 1995 and 2020. The analysis is done for All countries, Advanced Countries, Developing Countries, Emerging Countries, Financial Countries, and Non-Financial Countries sets.

Between 1995 and 2000 for all countries, CDS shows a rising path and then a diminishing trend; on the other hand, the exchange rate has a sharp increasing and falling trend. In that time interval, both indicators have a similar trend movement. Between 2000 and 2005, CDS follows a diminishing and the exchange rate has a rising trend with a minor variation. During the period between 2005 and 2010, CDS has an augmenting, and the exchange rate has an increasing trend till the end of the period. Between 2010 and 2015, CDS shows a downward and exchange rate upward fluctuating trend. Between 2015 and 2020, CDS has a downward trend then starts to rise through the end of the period; but the exchange rate has a rolling up trend until the period. After 2020, CDS starts to fall and the exchange rate continues its

increasing trend. In overall terms, in the first half of the period, CDS has a downward and the exchange rate has an upward trend. In the second half of the period, CDS generally follows a diminishing trend, and the exchange rate has an increasing trend. In both periods, indicators have reverse direction variation.

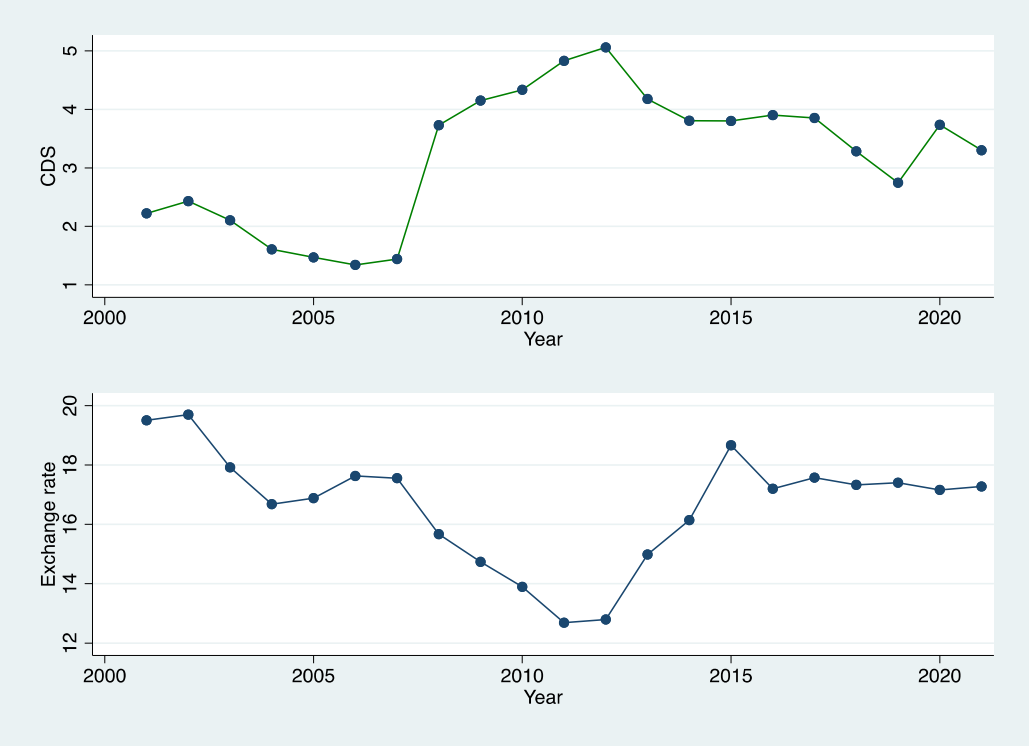


Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 7. The Analysis of CDS and Exchange Rate for All Countries

Between 1995 and 2000 for advanced countries, CDS presents initially a rising and then a falling trend, and the exchange rate follows a falling trend through the end of the period, where it starts to rise. Between 2005 and 2010, CDS follows a rising trend. On the other hand, the exchange rate initially rises and then it begins to fall through the end of 2010. During 2010 and 2015, CDS rises till the mid of the period and then it starts to fall, conversely, the exchange rate has a steady trend and then starts to increase. Between 2015 and 2020, CDS follows a steady trend after the mid of the period it starts to fall and ends up with a sharp rise. On the other hand, the exchange rate initially falls and then follows a smooth path. After 2020, CDS has a falling trend, but the exchange rate shows a slightly rising path. In general

perspective, in the first half of the period, CDS shows a rising trend on the other hand exchange rate has a diminishing trend. In the second half of the period, CDS has a fluctuating downward trend, but the exchange rate has a smooth rising trend. In a general perspective, in both analyzed terms the indicators move in opposite directions.

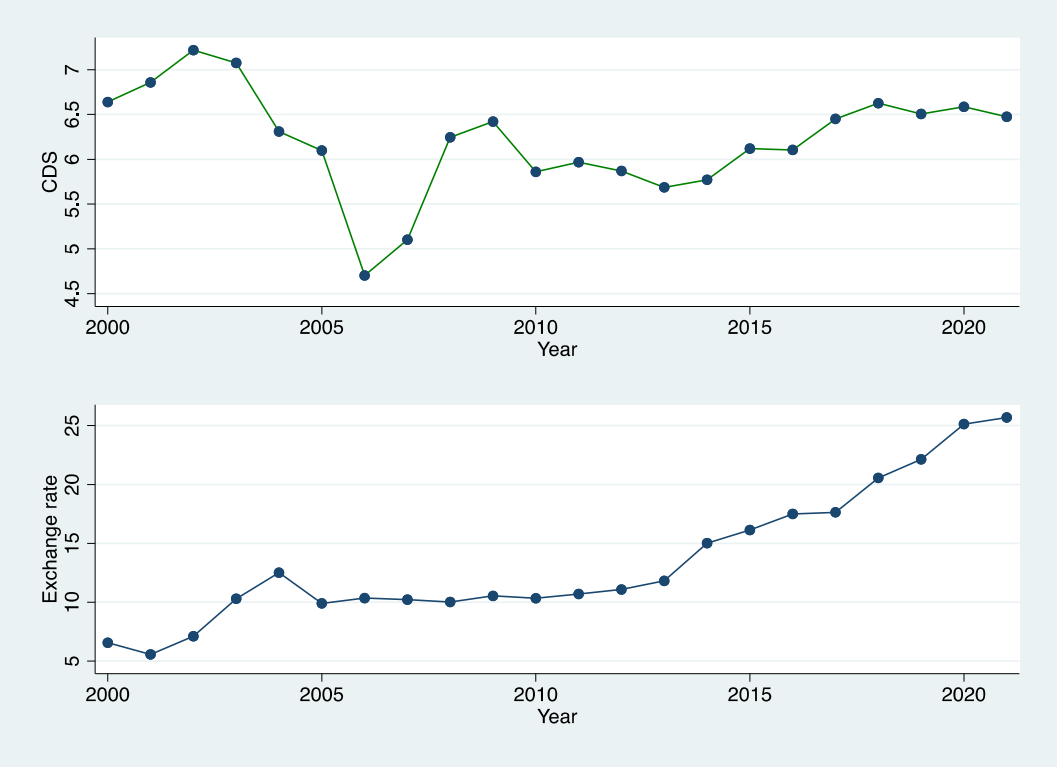


Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 8. The Analysis of CDS and Exchange Rate for Advanced Countries

Between 2000 and 2005 for Developing countries set, CDS shows an increasing and then decreasing trend, on the other hand, the exchange rate initially a rising and then a falling trend. Between 2005 and 2010, CDS initially has a rising trend on the other hand, the exchange rate has a smooth trend. During the period between 2010 and 2015, CDS has a smooth augmenting trend, on the other hand, the exchange rate has an uprising trend. The period from the beginning of 2015 till the end of the period, CDS follows a rising trend and similarly exchange rate follows a rising trend till the end of the period. In overall terms, in the first half of the period, CDS has a downward and the exchange rate has an upward trend. In the second half of the period, CDS has a steadily rising trend, and the exchange rate has a considerably

increasing trend. In the first period, indicators move conversely, but in the second period, they move in the same direction.

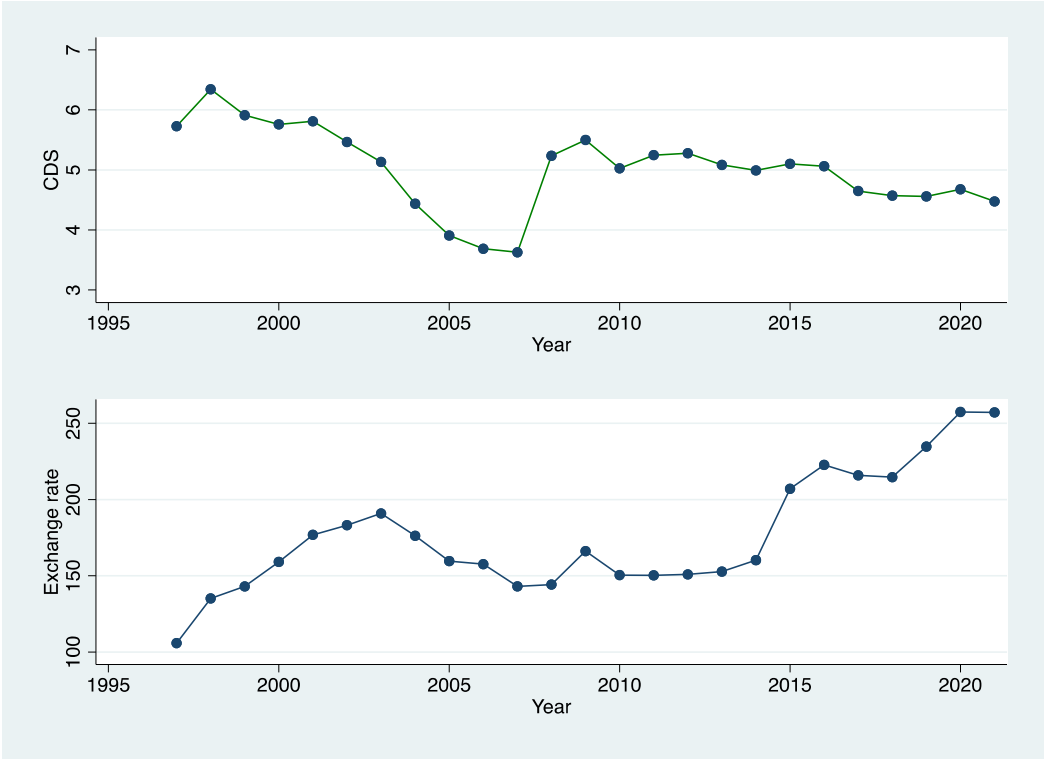


Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 9. The Analysis of CDS and Exchange Rate for Developing Countries

Between 1995 and 2000 for Emerging Countries, CDS presents initially a rising and then a decreasing trend, but the exchange rate has a rising path. Between 2000 and 2005, CDS presents a falling trend, and the exchange rate has a rise and fall path till the end of the period. During the term between 2005 and 2010, CDS initially has a falling and then rising trend, on the other hand, the exchange rate has a smooth path that follows a rise and fall trend. Between 2010 and 2015, CDS follows a steady trend, but the exchange rate follows a rising trend till the end of the period. From 2015 to the end of the period, CDS presents a smooth falling trend, but the exchange rate shows a rising path. In a general perspective, in the first half of the period, CDS has a falling path, on the other hand, the exchange rate has a smooth rising trend. In the second half of the period, CDS has a smooth downward trend, on the other hand, the exchange rate has an increasing trend through the end of the period. In a general

perspective, in the first half of the period, CDA has a falling and the exchange rate has a rising path. In the second half of the period, CDS has a falling, but the exchange rate has a rising trend till the end of the period. In both periods, indicators show converse direction variation.

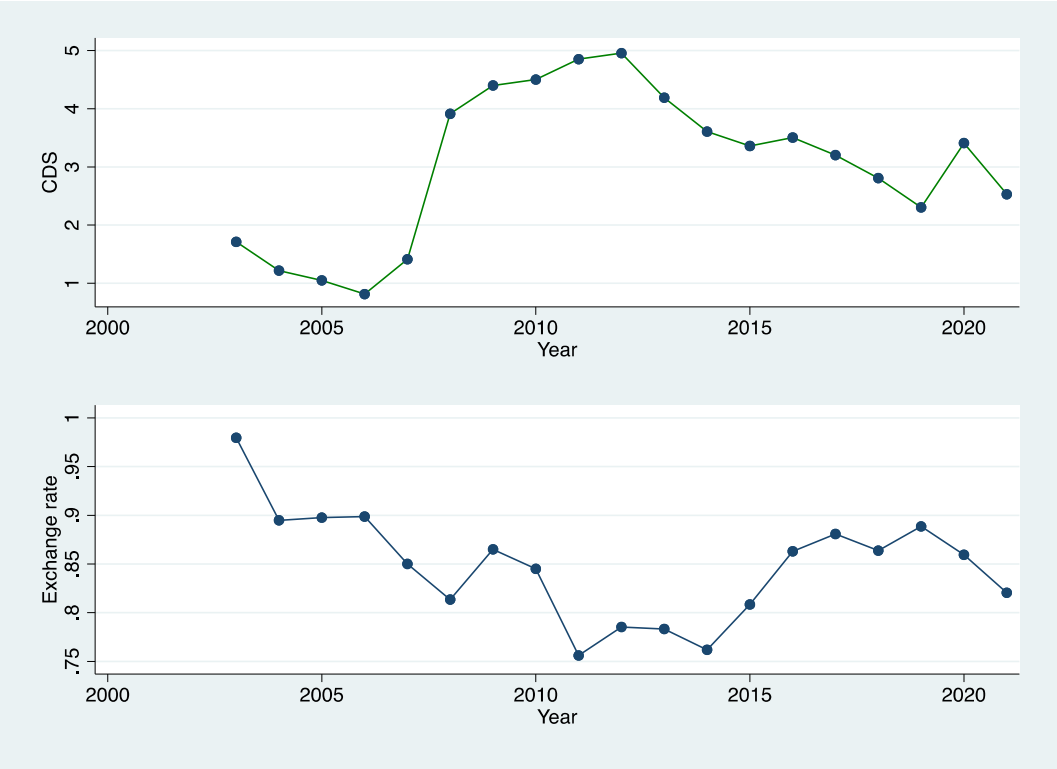


Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 10. The Analysis of CDS and Exchange Rate for Emerging Countries

Between 2000 and 2005 for financial centers, CDS and exchange rate shows a falling path. During 2005 and 2010, CDS follows a rising trend, and the exchange rate shows a falling trend. Between 2010 and 2015, CDS has a downward trend and the exchange rate has a smooth rising trend. From the beginning of 2015 till the end of the period, the exchange rate follows a falling path on the other hand exchange rate has a fluctuating rising trend.

In overall perspective, in the first half of the period, CDS has a rising and exchange rate decreasing trend. In the second half period, CDS has a falling trend, on the other hand, the exchange rate has a rising trend. In both periods, indicators move in reverse directions.



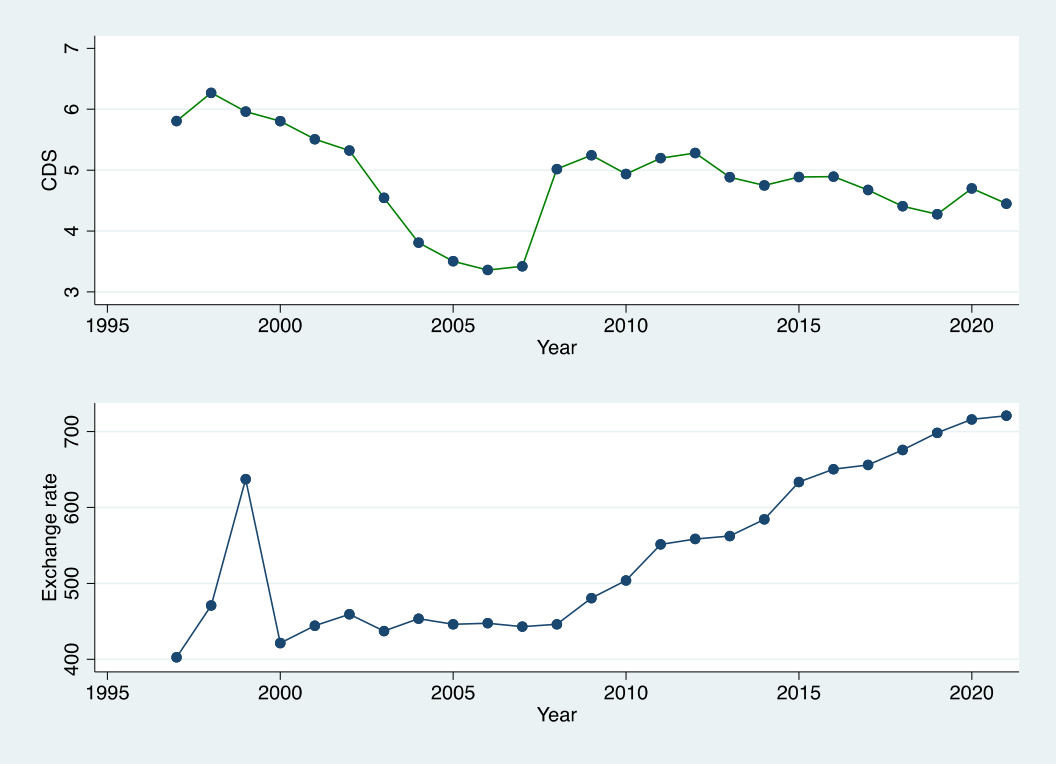
Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 11. The Analysis of CDS and Exchange Rate for Financial Centers

Between 1995 and 2000 for non-financial centers, CDS has a lowering path, and the exchange rate keeps a rising and then a falling trend. During 2000 and 2005, CDS follows a rising trend, and the exchange rate presents an increasing trend. Between 2005 and 2010, CDS shows a substantially rising trend, and the exchange rate has a rising path. Between 2010 and 2015, CDS has a smooth path, on the other hand, the exchange rate has a rising path. From the beginning of 2015 till the end of the period, CDS has a decreasing trend, on the other hand, the exchange rate has a rising trend.
In a general perspective, in the first half of the period, CDS has a falling, and the exchange rate has a rising trend. In the second half of the period, CDS has a smooth falling and significantly rising path. In both periods, both indicators show converse direct variation.

In the figures, it is obtained that for all, advanced, developing, emerging, financial, and nonfinancial countries, CDS and exchange rate values are analyzed for the period of 1995 and 2020. In the case of the whole period being analyzed by halves,

for all countries, both indicators move in opposite directions for each period for all analyzed country types. It is reached that, CDS and exchange rate move in opposite directions in analyzed periods for all country sets.



Source: Authors calculation (CDS spreads: Calculated 5- year sovereign CDS spreads, Exchange rate: Calculated exchange rate LCU per $ for every country)

Figure 12. The Analysis of CDS and Exchange Rate for Non-Financial Centers

2.3.1. Sovereign External Debt and Exchange Rate Mechanism: Are Credit Default Swaps and Exchange Rate Correlated?

The significance and effect of exchange rates on macroeconomics have been researched by previous research. Moosa (2005) analyzes this relationship as follows: a significant macroeconomics transmission mechanism is built by the exchange rate between the domestic economy and the rest of the world via asset markets and goods. The transmission mechanism is formed by the exchange rate in the goods market through the connection between foreign and domestic prices:

$$P = \alpha + \beta E P^{*} \quad (1)$$

Where foreign and domestic prices are represented by P^* and P respectively, and the exchange rate is defined as the domestic currency price of one unit of the foreign currency. Other market imperfections and transaction costs are symbolized by the parameters $\beta \; and \; \alpha$. The relationship is linear between foreign and domestic prices, and it is defined in terms of domestic currency. According to that, in case other things are same, higher exchange rate implies higher foreign good price in the domestic country ($\partial P/\partial E > 0$).

There exists exchange rate relation also in the asset markets. There is a dependence of the option between assets on the trade-off between return and risk, which is a transmission that can be defined over uncovered interest parity (UIP) and can be formulated as:

$$i = i^* + \dot{E}^e \tag{2}$$

Where $\dot{E}^e$ is the expected change in the exchange rate, i is the domestic interest rate and i^* is the foreign interest rate. When the conditions are eased with the assumption of risk neutrality, they change as:

$$i = i^* + \dot{E}^e + \rho \tag{3}$$

Where $\rho \; is \; the \; risk \; premium.$

Assuming fixed exchange rates, $\dot{E}^e = 0$, and if $\rho = 0$ then $i = i^*$, which is a situation that requires mobility of capital.

If this condition is not met and capital moves unrestrictedly across borders, the country can impose capital inflows and outflows.

2.4. Main Findings

Analyzing the estimation results, although it is not possible to generalize for all different groups, it can be deduced that there is a positive correlation between credit

default swaps and official exchange rates for all countries. This part reports the stylized facts about credit default swaps and exchange rates for all countries, advanced countries, emerging countries, financial centers, non-financial centers, and developing countries. Consistent with recent studies, the relationship between credit default swaps and exchange rate movements is controlled.

The significance of the relationship shows variation between the country groups, and it is in line with the magnitude of the ratio of cross-section units to the total number of observations. The sign of the relation can be positive and negative for different country groups independent of the significance of the coefficient. In addition to that, a change in credit default spread originating from a change in the exchange rate is higher than a change in exchange rate generated by a change in credit default spread. This relation shows negative and positive variation between groups, but within the group, the sign of the impact shows stability. In absolute terms comparison, the highest marginal impact of the official exchange rate on determining credit default spread is seen in financial centers. On the other hand, the lowest marginal impact of the official exchange rate on determining credit default spread is obtained in developing countries. While the exchange rate has a negative impact on determining credit default spread for advanced countries and financial centers, it turns to reverse for developing countries as the exchange rate has a positive effect on credit default spread All these results answer the question that, both credit default swap and exchange rate affect each other, for different country groups.

2.5. Assessment of the macroeconomic effect of the crisis and sovereign default crisis

The determinant factors of sovereign default span different areas of economies, which includes macroeconomics, finance, and international markets… Macroeconomic factors are one of the main determinants of the economies. Joy (2012) analyzes the macroeconomic determinants of sovereign default. It is observed that a larger budget deficit and high-interest payments on external debt are the most powerful macroeconomic factors for sovereign default. For the available periods of default, decreasing public debt matters for the process.

The finance market's impact is also measured on the banking sector and its transmission channels. Correa et al. (2014) analyze the transmission mechanism between the sovereign crises and the banking sector, focusing on the impact of sovereign distress on bank solvency and financing. They then emphasize the considerable cost to the real economy of the close link between banks and sovereigns. Correa et al. (2014) highlight the importance of breaking the cycle between these sectors.

2.6. Determinants of Sovereign External Default

The literature claims that in addition to macroeconomic, and financial factors, political factors possibly affect the sovereign defaults of the economies. Verma (2002) states that political factors are significant determinants of the willingness to repay and should be treated as an explanatory variable explicitly. Especially it is obtained that, the probability of default is related to the level of democracy in the debtor country. International monetary conditions are stated as another possible factor that could affect the sovereign default. Ghulam et al. (2018) claim that the volatilities of the treasury bills rate have significant effects on defaults. In addition to that, especially the following macroeconomic factors have important effects on sovereign defaults: GDP per capita, export growth, inflation, and higher debt/ GDP ratio affects the probability growth.

Three macroeconomic factors are utilized to estimate the factors which are determinant for sovereign CDS spread: the international reserves, the external debt, and the current account. It is obtained that, in the short run international reserves and external debt are significant but the current account is not.

Another assessment is made by Hilscher et al. (2010), which analyzes the impact of macroeconomic fundamentals on sovereign credit spreads. In particular, terms of trade volatility is estimated to have a significant impact on spreads. Country fundamentals are found to have explanatory power when global factors and credit ratings are controlled. In addition to economic factors, institutional factors are also argued to have an impact on sovereign defaults and analyzed by Bandiera et al. (2010).

It is argued that indebtedness is associated with the probability of default. For countries with higher debt levels, the importance of the quality of institutional settings and policies emerges and the significance of managing debt in reducing the probability of default is shown. Analyzing both macroeconomic factors and financial determinants together, Chakrabarti et al. (2014) examine the determinants of sovereign default by applying extreme bound analysis (EBA) to 190 countries between 1970 and 2010.

It is obtained that there is a relationship between sovereign default and creditworthiness, growth, average on export earnings, reserves, debt service ratio, inflation, trade deficit, exchange rate, and democratic accountability, and corruption.

2.7. Sovereign External Default: Causes and Consequences of the crisis

The cost of sovereign external default is analyzed by Farah et al. (2022) and it is argued that growth, output per capita, poverty headcounts, nutrition energy, health outcomes, infant deaths, and life expectancy are strictly affected by sovereign defaults. There are important differences between sovereign debt and private debt and the definition highlights those differences. The government policies towards sovereign debt affect not only government policies but also private sector debt policies at the same time. The impact of government public debt policies on the private sector is analyzed by Trebesch (2009). They find that aggressive sovereign debt policies lead to a substantial reduction in firms' access to bond issuance, loans, and external financing and the results suggest that coercive government steps towards external creditors can have substantial signaling effects on domestic firms with negative spillovers. In addition, they conclude that debt negotiations may be important to reduce the domestic costs of sovereign defaults.

2.7.1. Measuring sovereign default risk

The sovereign debt and default are analyzed to find and define their determinant factors. The literature spans various factors for defining the causes and consequences of sovereign default and Aizenman (2013) explores the relative influence of miscellaneous economic fundamentals in accounting for sovereign credit default

swap (CDS) spreads of emerging markets. They find that commodity terms of trade volatility, external debt, and inflation vulnerability are positively related to sovereign CDS spreads, whereas fiscal balance/GDP ratio and trade openness are in negative relation with sovereign CDS spreads. Aizenman (2013) measures the time effect of sovereign default and finds that sovereign vulnerability and trade openness are critical factors in the pre-crisis period, inflation and external debt/GDP ratio in the crisis period, and public debt/GDP ratio and inflation in the post-crisis period.

The behaviors and also debt relief affect the relationship between sovereign default and sovereign default risk; also has an impact on sovereign default. For emerging countries, corporate access to international capital markets is influenced by sovereign risk through equity issuances and external credit. It is shown that private sector access to debt and capital is significantly determined by sovereign default risk.

It is argued that sovereign default risk is affected by many factors as financial factors, and unions, which is analyzed by Uhlig (2013). The analysis research on the interrelationship between central bank guarantees, sovereign default risk, bank regulation, and banks in a monetary union. It is argued that regulators in risky countries tend to allow their banks to hold risky bonds and risk default, whereas regulators will impose tough regulations in other safe countries and certainly regulate their banks in such a way that all losses have to be covered privately. Since governments in risky countries borrow more cheaply, some of the possible sovereign default losses are moved to the common central bank effectively.

Another assessment of private and public debt and their impact on an open economy is done by Arce (2021) and it is obtained that large amounts of private debt raise the commonness of financial crises. The government resorts to financing risky public debt, resulting in a sovereign debt crisis during such crises, which means a higher likelihood of sovereign default.

The sovereign risk is also affected by currency units and also, the composition of the currency units that are analyzed by Du et al. (2021). The analysis focuses on the evolution of the currency composition of corporate and sovereign external lending in emerging markets over the last fifteen years and argues that greater dependence of

the corporate sector on foreign currency borrowing is related to higher sovereign default risk. The currency composition of corporate borrowing is shown to have an impact on a country's incentive to inflate or default.

Government policies, especially fiscal and monetary policies, are analyzed in the case of macroeconomic fluctuations and stabilization policy, when there is a critical issue of fiscal solvency. It is concluded that rather than harsh inflation targeting, a fiscal feedback like exchange rate targeting, a monetary response to default premiums or a deficit to taxes applied relatively strong is more stabilizing and effective.

The fiscal policy impact and its relationship with the interest rate with the perception of sovereign default risk is analyzed by Laubach et al. (2011). The effects of fiscal policies on interest rates are shown to emerge when investors access and price the risk of sovereign default. It is argued that there is an apparent connection between countries' fiscal positions and time variation in common indicators of risk aversion.

2.7.2. Determinants of Sovereign Ratings

Sovereign default is affected by various factors as listed in prior sections, macroeconomic factors, financial factors, political factors, and institutional factors. The previous research focus on different factors and credit rating agencies' determinant factor is analyzed by Cantor et al (1996). The study analyzes the factors underlying sovereign ratings and the impact of these ratings on borrowing costs for sovereigns. The focus is on Moody's Investors Service and Standard & Poor's. The study finds that the agencies include six significant macroeconomic fundamentals, namely per capita income, GDP growth, inflation, external debt, level of economic development, and default history. Moreover, the study suggests that changes in the agencies' sovereign risk opinions are followed by bond yield movements in the expected direction.

While much prior research concentrates on macroeconomic factors and financial factors, the history of default is analyzed by Choe et al. (2015). In that research, they

concentrate on both macroeconomic and institutional determinant factors and show that economic freedom, history of default, and economic development are the variables that are determinants of ratings.

A study conducted by Afonso et al. (2011) analyzed the factors that influence sovereign debt ratings assigned by three major rating agencies: Fitch Ratings, Moody's, and Standard and Poor's (S&P). The study separated the short-term and long-term effects of macroeconomic and fiscal variables on a country's rating. Changes in GDP per capita, GDP growth, government debt, and government balance have a short-run impact on a country's credit rating. However, government effectiveness, external debt, foreign reserves, and default history are important long-run determinants.

2.7.3. Sovereign Credit Rating Agencies and their ratings

Sovereign default and sovereign credit rating relation is a technique used to measure and evaluate the conditions of credit rating agencies. The behavior of sovereign credit ratings also varies through events. According to Reinhart's analysis in 2002, the behavior of ratings after a crisis differs between developed and emerging markets. It has been found that sovereign credit ratings tend to be more sensitive, especially in the case of emerging markets. The probability of downgrade and the size of the downgrade are higher for EMs.

According to the study, sovereign credit ratings play a crucial role in determining the terms and conditions under which countries can access international capital markets. The study also highlights the link between currency crises and sovereign default and concludes that credit ratings can be used to predict the likelihood of default.

2.7.4. CDS Spreads and Bond Yield spreads

Factors specific to a country and their impact on the relationship between credit default swaps (CDS) and bond markets are important when evaluating sovereign CDS. Research by Hassan et al. (2011) explores the relationship between sovereign

CDS, bond markets, and the level of financial integration in emerging markets. Their findings indicate that sovereign CDS and bond markets are co-integrated. The study suggests that external factors have a significant influence on variations in sovereign credit risk and bond yields, while country-specific factors have an insignificant role.

Eaton (1996) analyzes reasons of repay to evaluate creditworthiness as repaying a loan improves future credit terms. Eaton (1996) states that sovereign borrowers cannot impose loan contracts on other parties. And the inference is that borrowers that pay back loans might find their credit terms improve through time but borrowers that face default worsening conditions and that borrowers who repay loans might find their credit terms become worse. It is added that borrowers might benefit from dealing with a banking system that can make a commitment to excluding them from future borrowing and then they default.

Haugh et al. (2009) analyzed the differences in the yield spread of sovereign bonds. The study highlights the importance of fiscal performance, particularly in the estimation of the ratio of debt service to tax receipts and expected fiscal deficits.

2.7.5. Sovereign External Default, credit default swaps, and exchange rates.

Previous studies have discussed the macroeconomic factor that determines sovereign default, focusing on the impact of exchange rate. However, there have been conflicting results about the precise effect of changes in the real exchange rate around sovereign defaults. Goldstein et al. (2000) claim that such changes do not have a significant impact on the likelihood of default.

Asonuma (2016) has analyzed the relationship between exchange rate dynamics and sovereign defaults. The study indicates that there is a connection between real exchange rate depreciation and default probability around defaults, and moments of the real exchange rate that match data. The research also examines the market impact and output relation. It is shown that interactions of real exchange rate depreciation trigger default before default. However, after the default, the resulting output costs and loss of market access due to default cause more real exchange rate depreciation.

In the article by Joya et al. (2016), the authors discuss the relationship between macroeconomic indicators and the exchange rate. They suggest that the determination of the exchange rate is influenced by factors such as interest rates, term structure, and purchasing power parities. The authors also demonstrate that there is a significant connection between the real exchange rate and sovereign risk. Sovereign CDS is a useful tool for trading credit risk, and its term premia reflects investors' perception of sovereign credit risk over different time periods. According to the authors, in general, the CDS term premia for a country can predict its currency's appreciation against the US dollar.

Celasun et al. (2008) conducted a study on the impact of private sector debt and government sector debt on sovereign debt. The research analyzed the wide range of external debt themes. The study investigated the relationship between the share of the private sector in total external debt, creditworthiness, and the possibility of sovereign default in developing countries. The study suggests that a higher share of the private sector in total external debt is linked to a reduced chance of sovereign default.

2.7.6. Sovereign external default: Are credit default swaps and exchange rates correlated?

Corte et al. (2021) have analyzed the impact of currency and its volatility on sovereign default and risk. They have found that an increase in a country's sovereign risk, estimated by credit default swap spreads, is associated with the depreciation of its currency and an increase in its volatility. The study claims that the relationship between currency excess returns and sovereign risk is primarily based on default expectations and is subject to global sovereign risk shocks. The research provides a predictive estimate for currency risk premia. It is demonstrated that a sovereign risk factor is priced in the cross-section of currency returns.

Foroni (2017) analyzed currency variations and suggested that sharp fluctuations in currency values are related to sovereign credit risk. Thus, by considering the likelihood of sovereign default events, we can obtain crucial information on the

future direction of exchange rates. In addition, it is possible to predict variations in the risk of sovereign debt markets to currency markets by introducing a new risk premium factor that accounts for the impact of sovereign default risk on exchange rate returns.

2.8. Sovereign Default analysis overview

2.8.1. What is Sovereign Borrowing: Sovereign Debt?

Sovereign debt is defined in the literature by focusing on various factors that determine it. From a liquidity perspective, Martinez et al. (2022) define sovereign debt issued by a national government as a unique type of asset that is at least safer and more liquid than privately issued debt. They also note that the enforcement of sovereign debt is diversified, with differences between advanced and emerging countries. In advanced countries, the government cannot politically afford to default since the domestic household bears the majority of the tradable debt. In contrast, in emerging and developing countries, the government may face institutional problems and complications in dividing external and domestic debt markets.

Aguiar et al. (2013) define the limited mechanism for implementing sovereign debt, stating that it is the primary difference between sovereign debt and private debt, whether domestic or international.

According to Tomz et al (2003), the occurrence of default, the length of time it lasts, and the impact on both creditors and debtors are analyzed. They define default as the situation where the debtor violates the legal terms of the debt contract. However, credit rating agencies such as Standard and Poor's (S&P) use Beers and Chambers' (2006) definition, which considers default to have occurred when the sovereign affects the contract or when the sovereign offers a new debt exchange with less favorable terms than the original issue.

External sovereign debt refers to the financial obligation that arises when governments borrow from foreign investors. The stock of external sovereign debt is

measured and defined by Tomz et al. (2013) through a study that focuses on the quantity and price of the debt.

This study also analyzes three key features of sovereign debt, namely currency composition, maturity structure, and contractual clauses. According to Tomz et al. (2013), data on the stock of sovereign debt is considered as one of the major parts of financial assets and is generally valued at face value.

2.8.2. What is the distinction of sovereign debt borrowing?

In the previous section, we argued that sovereign debt is a particular type of debt that is defined differently by various researchers. In this section, we will discuss the similarities and differences between sovereign debt and other types of debt. Hatchondo et al. (2007) compared sovereign debt with private sector debt and found that both governments and consumers make long-term investments and finance them to sustain their investments. While consumers aim to maintain their standard of living and smooth out their consumption, governments aim to reduce their expenditures.

The distinction between sovereign debt and private debt is explored in terms of deposit acquisition. On the deposit side, there are various types of assessments. According to Martinez et al. (2002), the private sector can easily obtain collateral resources to support its borrowing conditions. On the other hand, Djankov et al. (2007) argue that creditor protection is challenging for developing countries, making it more difficult for obligated borrowers to repay or provide collateral.

Berger et al. (1990) conducted an analysis on the lending practices of US domestic banks and found that collateral plays a significant role in loan approval. In Argentina, nearly 70% of commercial and industrial loans are secured by collateral. Martinez et al. (2022) examined debt repayment of sovereign nations and concluded that in case of default, there is no legal authority to force repayment. On the other hand, Wright (2002) argues that sovereign debt is unsecured, and efforts to claim sovereign assets have had limited success.

There are notable differences between the bankruptcy conditions applicable to private sector and government sector. In the private sector, institutions regulate and determine bankruptcy conditions. However, in the case of sovereign default, there are no forced institutions. Additionally, politico-economic factors that affect the issuance of government debt are another difference between households and the government sector, as households do not face these restrictions.

2.8.3. Sovereign Debt Restructurings and Defaults

Sovereign default is the process that begins with sovereign debt, in the case of the debt is not paid back and the debt turns to a restructuring process. If the restructuring process progress properly, then the debt is paid back. If the process does not work properly, in this case, debt turns to default. The literature makes different definitions of sovereign default like sovereign debt. For instance, Martinez et al. (2022) make the definition from a constitutional perspective and defined it as a normal consequence of part of the debt contract. On the other hand, institutional interpretation of the default is done by IMF by separating debt restructurings and post-default restructurings.

In their 2016 analysis, Asonuma et al. examine the IMF's perspective on debt restructurings. They focus on the relationship between preemptive and post-default restructuring and find that 38% of debt restructurings between 1978 and 2010 are preemptive. The researchers compare the time it takes to negotiate these two types of restructuring and show that post-default restructurings take an average of 12 months. In another analysis, Peter (2002) examines how credit rating agencies evaluate default. He finds that credit rating agencies tend to define default as an event in which a sovereign is offered debt restructuring terms that are less favorable than the original terms.

Martinez et al. (2022) have analyzed the frequency of sovereign defaults and have concluded that they occur in cycles. These cycles reflect the boom-bursting nature of international capital flows. The researchers have analyzed the last two centuries and have identified four main peaks in emerging market defaults, which occurred in the

1830s, 1880s, 1930-1940s, and 1989s. Dvorkin et al. (2021) have analyzed the process of debt restructuring and have suggested that it involves following certain rules and regulations. Debt restructuring usually results in new payment promises that may include a combination of lower principal, lower interest payments, and longer maturities.

Sovereign debt, default, and restructuring can result in loss for investors, which is commonly referred to as a "haircut". The haircut is calculated as the difference between the pre-restructuring debt and its present value, expressed as a percentage. Two different methods are used to determine the haircut - one involves the insights of market practitioners, while the other is based on academic research.

The market practitioners tend to compare the present value of the new debt with the face value of the old debt using HM, which is defined as Haircut Methodology.

$$HM = 1- \frac{Present\ value\ of\ new\ debt\ obtained\ in\ the\ restructuring}{Face\ value\ of\ old\ debt\ surrendered\ in\ the\ restructuring} \quad (4)$$

The second measure is calculated based on the empirical academic literature and depends on the comparison between the present value of the new and old payment stream, both evaluated at the existing yield (HSZ).

$$HSZ = 1- \frac{Present\ value\ of\ new\ debt\ obtained\ in\ the\ restructuring}{Present\ value\ of\ old\ debt\ surrendered\ in\ the\ restructuring} \quad (5)$$

Tomz et al. (2013) argue that the existing literature assumes that all debts mature in one period. They propose two techniques to measure the maturity of debt: "contractual maturity," which is the final principal repayment, and "Macaulay duration," which is the sensitivity of debt's present value to a constant discounted rate. Macaulay duration is estimated by the discounted cash flow and represents the weighted average of the dates of future cash flows.

Tomz et al. (2013) also suggest that both the probability and duration of default depend on how the analyzer defines default. They follow a similar approach to Beer

and Chambers (2006) and note that, according to S&P, a default ends when a settlement occurs. Near-term resolutions of creditors are treated similarly.

2.8.4. When do Governments default?

When a government accumulates debt but is unable to pay it back, it may default. The government may choose to default because the costs of doing so are lower than the costs of repaying the debt. There are various reasons why governments default, including economic conditions, political factors, and the affordability of rolling over debt.

According to Martinez et al. (2022), the state of the economy plays a significant role in determining whether a government can afford to pay its debts. Hatchondo et al. (2007) suggest that affordability is affected by factors such as economic downturns, terms of trade shocks, devaluation of the local currency, and contingent liabilities.

Another perspective on economic downturns is the analysis of financial payment. A research by Rivoli et al. (1997) claimed that when economic circumstances are poor, the interest rate paid by the government becomes more cyclical, and markets expect more defaults

The ability to repay debt can be influenced by several factors, including the terms of trade. According to Mendoza (1995), many developing economies rely heavily on commodity exports as a source of tax revenue and foreign exchange. The research by Catao et al. (2002) researches the perspective of emerging countries and concludes that fluctuations in the terms of trade are significant predictors. The affordability of debt can also be affected by a devaluation of the local currency.

Sturzenegger et al. (2007) claim that the sharp decline in oil prices during the late 1990s played a role in the macroeconomic and fiscal problems that led to the Russian default of 1998. In addition, the level of public debt is a crucial factor in determining affordability. Badia et al. (2020) argue that the levels of public debt and public debt service are important indicators of fiscal crises.

If a country's government borrows money in foreign currency but relies mostly on revenue from non-tradeable goods and taxes, then a decline in the value of its local currency can make it harder for the government to pay back its debts. This is known as "currency mismatch" and it can be a major problem for banks, corporations, households, and governments alike. When a currency mismatch occurs, it can lead to bankruptcies and a drop in investment, which in turn reduces government revenue.

According to Manasse et al. (2009), the terms of trade can be analyzed through the "exchange rate perspective". They suggest that the overvaluation of exchange rates and volatility of exchange rates can predict a sovereign debt crisis. Similarly, Ghulam et al. (2018) and Badia et al. (2021) state that exchange rate fluctuations play a significant role in predicting crises. Badia (2020) has also shown the relationship between fiscal and currency crises. Furthermore, Badia et al. (2021), Baltaneuand, Erce et al. (2018), and Ghulam and Derber (2018) have analyzed how concerns of banks and sovereigns impact each other.

One of the factors that can trigger a financial crisis in developing countries is a sudden rise in interest rates in advanced countries, such as the United States. According to various studies by Cline (1995), Lambertini (2001), Arora and Cerisola (2001), Uribe and Yue (2006), and Ghulham and Derber (2018), the borrowing costs of developing countries are influenced by US interest rates.

Another factor that can cause a financial crisis is a collapse in confidence or an increase in risk aversion, which can lead to a sudden stop or a "debt run". This phenomenon has been documented by Calvo (1998) and studied by Sachs (1984), Calvo (1988), Cole and Kehoe (1996, 2000), and Lorenzoni and Wernin (2019). Sudden stops have been responsible for several international financial crises, including the 1995 Mexican Debt Crisis, the Asian Crisis in 1997, the global financial crisis of 2008, and the tightening of emerging market borrowing conditions in March 2020.

Global factors and risk premium impacts are analyzed by Longstaff et al. (2011), who state that global factor account for 64 percent of the variation in sovereign

spreads, and on average, the risk premium is formed about a third of sovereign spreads.

The second factor is rolling over, which is a political factor. VanRijckeghem and Weder (2004); Hatchondo et al. (2010) claim that this occurs as government endorsement may increase important changes in the sovereign's willingness to pay. In a default episode, Sturzenegger and Zettelmeyer (2007) conclude that a solvency crisis can be triggered by a shift in the parameters that govern the country's willingness to make sacrifices to repay due to changes in the domestic political economy.

Ams et al. (2019) address the reasons behind sovereign debt distress and default. They identify mismanagement, misfortune, contractual terms, and self-fulfilling debt crises as the main drivers of sovereign default.

2.8.5. Why do governments prefer high and volatile sovereign risk?

Sovereign default causes many costs for every part of the state. Despite the costs of sovereign default, why the governments accept sovereign default? The literature analyzes different factors as possible factor analysis.

The problem of sovereign debt dilution arises from three factors. Firstly, the government issues long-term debt. Secondly, the current government has no control over the debt issuances of future governments. Lastly, rational investors price bonds based on the expectation that additional borrowing by future governments will increase the risk of default on long-term bonds issued by the current government, resulting in a lower price for these bonds. Aguiar et al. (2019) conducted an analysis of debt maturity profiles and found that actively managing the debt maturity profile can have a self-defeating effect on debt prices.

Bocola and Davis (2019) conducted an analysis on how the rollover fundamental risk is related to changes in maturity choice. Similarly, Sanchez et al. (2018) and Dvorkin et al. (2020) analyzed the timing of sovereign debt crisis and how endogenous

maturity can help explain it. However, the choice of maturity creates tradeoffs that need to be carefully considered.

2.8.6. The Costs of Sovereign Default

According to Martinez et al. (2021), defaulting on a debt comes with a cost, which means that it is essential to avoid defaulting frequently. When it comes to sovereign debt, there are situations where it is more expensive for a country to default than to repay its debt. However, the existence of sovereign default implies that there are also scenarios where it is more costly for a country to pay back its debt than to default. To better understand these costs,

Martinez and colleagues (2021) argue that the cost of default obligates nations to avoid defaulting frequently. Therefore, when it comes to sovereign debt, it should be more expensive for a country to default than to repay its debt under some circumstances. However, for a nation to default, there must be situations where repaying the debt is more expensive than defaulting.

To categorize these costs, Panizza ett al.(2009) identified four main types: financial penalties in the form of higher borrowing costs and/or capital market exclusion, direct sanctions, trade costs, reputational spillovers, and domestic financial and political costs.

Furceri et al. (2012) conducted a panel data analysis to examine the impact of the debt crisis on the Gross Domestic Product (GDP). The study revealed that a debt crisis leads to significant and long-lasting output losses. The researchers concluded that a debt crisis has more devastating effects than banking and currency crises.

Tomz et al. (2013) argue that sovereign bonds have been traded on international capital markets for centuries. There are several ways to measure the cost of borrowing, with one of the most common being the "current coupon yield." This measure is calculated by dividing the nominal interest rate by the market price of the

bond. The "holding period return" is another technique that adds any amortization payments and capital gains to the coupon yield.

2.8.7. Access to and costs of external borrowing

Eaton et al. (1981) analyzed the need for an enforcement mechanism and concluded that, in the absence of any other measure, the threat of permanent exclusion from international capital markets could deter defaults by borrowers. However, it is challenging to impose essential punishment both theoretically and empirically.

In recent years, exclusion from international capital markets has become an effective mechanism for enforcing sovereign debt contracts issued under foreign law, according to Martinez et al. (2022). While court orders may not result in the attachment of a debtor's assets, they sometimes allow holders of defaulted bonds to interfere with cross-border payments to other creditors who have agreed to a debt restructuring.

2.8.8. Direct sanctions and trade costs

Martinez et al. (2022) state that there are two types of costs associated with sovereign default. The first type of cost is the direct cost to the country that has defaulted. The second type is the direct sanctions and trade costs that result from the default. Governments often intervene to support their members who hold defaulted debt issued by other countries. These interventions include diplomatic dissuasion, withholding of official credit, treatment of trade sanctions, and in exceptional cases, armed interventions.

Mitchener and Weidenmier (2005) claim that between 1870-1914, there were about a dozen cases of sanctions imposed on countries that defaulted. Rose (2005), Asonuma et al. (2016), and Serfaty (2020) analyze the relationship between sovereign defaults and their impact on international trade. Borensztein and Panizza (2009) also analyze the link between sovereign defaults and the reduction in trade finance. They found that defaults in the 20th and 21st centuries no longer lead to trade sanctions.

Furthermore, the evidence does not seem to support a link between sovereign defaults and the reduction in trade finance.

2.8.9. Default as a negative signal about the government or the state of the economy

Sovereign default occurs when a government is unable to pay back its debt, resulting in a default. Hatchondo et al. (2009) argue that sovereign default is costly because of the information it signals. For instance, when a government defaults, it can indicate its policy preferences, such as borrowing practices, which can have negative consequences for the broader economy. Sovereign default not only affects credit relations but also capital flows.

Cole and Kehoe (1998) argue that a sovereign default can lead to a loss of trust in the government's reliability in other areas besides credit relationships with lenders. One consequence of this could be capital flight. Sandleris (2018) analyzed investment evaluation and found that default agreements can provide negative information about the state of the economy. In addition, it can also depress the net worth of firms and provide a negative argument for investment.

2.8.10. Domestic financial and political costs

Martinez et al. (2022) argue that political cost is a type of cost associated with sovereign debt. They state that when a government defaults on debt held by domestic residents (who are generally voters), it may face political consequences. Broner et al. (2010) evaluate political costs from the perspective of the relationship between domestic political costs and the presence of well-functioning secondary markets. They propose a theory of sovereign debt in which default is deterred by the combination of domestic political costs and the presence of efficient secondary markets.

Reinhart and Rogoff (2011) analyze the ownership of sovereign debt and report that a significant proportion of it is issued under domestic jurisdiction and held mainly by local residents. The IMF (2021) and Erce et al. (2022) also support this finding.

Martinez et al. (2022), Boresztein and Panizza (2009), and Malone (2011) have suggested that when a country defaults on its debt, it increases the likelihood of job loss for political leaders. They argue that the negative impact of a default on the economy can be just as harmful before the default actually happens, as the expectation of a default can have negative effects on output.

Therefore, the effects of a default on the economy may not only be caused by the default itself, but also by the anticipation of it.

2.8.11. Quantifying the output cost of sovereign defaults

Sovereign defaults are said to include borrowing costs, financing embargoes, trade reductions, reputational spillovers, and losses incurred by domestic financial intermediaries that may affect output. However, estimating the output cost of sovereign defaults is a challenging task, as per Martine et al. (2022). While it is easy to observe a negative relationship between default and growth, it is difficult to determine whether the negative correlation is driven by the default or other factors that explain both the default and low growth.

According to Trebesch et al. (2016), the default period can be divided into two main episodes, namely default and debt renegotiation, since the 1980s. During the default episode, two types of defaults can occur, namely hard and soft defaults. These are determined by debtor payment, negotiation behavior, and the size of haircuts towards private external creditors. Hard defaults are associated with a much steeper drop in GDP compared to soft defaults.

De Paoli et al. (2006) state that emerging market economies (EMEs) have frequently defaulted on their sovereign debts. The article also analyzes the size and costs associated with these debts. It further highlights that the decrease in output level is especially significant compared to the default related to banking and currency crises.
De Paoli et al. (2009) analyzed the impact of sovereign default and found that output loss is higher in sovereign default than in currency crises and banking crises. However, in the case of twin or triple crises, the output loss will be higher than in sovereign debt crises.

Sturzenegger et al. (2007) discuss the legal characteristics of sovereign debt and classify all properties under the principles protecting sovereign debtors, governing law, and bond contracts. The principles protecting sovereign debtors state that sovereigns are often held legally liable for breach of commercial contracts with foreign parties similar to private parties. Sovereign immunity laws are more effective in preventing attachment as attempts to immediately acquire a preferable judgment have been made. The governing law states that sovereign bonds are classified as either international bonds distributed by a government in an international financial center under foreign law, or domestic bonds issued in the debtor country under domestic legislation.

Sturzenegger et al. (2007) have defined the term "governing law" for bonds that fall under two categories: international bonds distributed by a government in an international financial center under foreign law, and domestic bonds distributed in the debtor country under domestic legislation. The latter is called "bonds contacts" and it refers to the covenants made by the debtor to the creditors. A negative covenant specifies the actions that the debtor promises to take to reduce the value of the claim. Bond contracts also define remedies, which are the consequences that follow if any of these conditions are violated. The contract also includes alternatives in the event of default by the debtor on a third party, known as "cross default". The conditions under which the terms of the bond contract can be changed are governed by "amendment clauses".

Perez (2011) analyzed the decision to pay back debt or default and found that the costs of default should be limited, leaving default as an option, but only at much higher levels than the observed debt-output and default ratios of emerging economies.

2.9. Literature for panel data approach

Panel data approach is preferred by researchers due to its advantages over traditional cross-sectional or time-series data sets, as stated by Hsiao (2003). The panel data consists of multiple observations on each individual in the sample, which is suitable

for estimating the analysis for diverse types of country groups. Hsiao (1985a, 1995, 2000) claims that panel data sets for economic research possess several major benefits, including providing collinearity between explanatory variables. Panel data combines both cross-sectional and time-series data sets, which makes it a valuable tool for researchers.

Panel data offers advantages in constructing and testing more complex models compared to using completely cross-sectional or time series data. It also helps to resolve the key econometric problem and generates more accurate predictions for individual outcomes. The fixed effect model is a method in which investigators make estimation conditional on the effect that is present in the sample.

According to Arellano (2003), there are at least two motivations for the econometric interest in panel data, particularly in micro econometrics. Firstly, it is desired to exploit panel data to control unobserved time-invariant heterogeneity in cross-sectional models. Secondly, panel data is used to disentangle components of variance, estimate transition probabilities among states, and study the dynamics of cross-sectional populations.

Two approaches in the panel data literature are fixed effects and random effects models. Arellano explains the “panel data fixed effect model data”.

The basic assumptions for what it calls the "static fixed effects model" are as follows. It is assumed that $\{(y_{i1}, \ldots, y_{iT}, x_{i1}, \ldots, x_{iT}, \eta_i), i = 1, \ldots, N\}$ is a random sample and that

$$y_{it} = x'_{it}\beta + \eta_i + v_{it} \quad (6)$$

Together with

Assumption 1:

$$E(v_i \mid x_i, \eta_i) = 0 \ (t=1, \ldots\ldots, T) \quad (7)$$

Where $v_i = (v_{i1},...,v_{iT})'$ and $x_i = (x_{i1},...,x_{iT})'$. We observe y_{it} and the $k \times 1$ vector of explanatory variables x_{it} but not η_i, which is, therefore, an unobservable time-invariant regressor.

Similarly, we shall refer to "classical" errors when the additional auxiliary assumption holds:

Assumption 2:

$$Var(v_i \mid x_i, \eta_i) = \sigma^2 I_T \tag{8}$$

Under Assumption A2 the errors are conditionally homoscedastic and not serially correlated. Under Assumption A1 we have

$$E(y_i / x_i, \eta_i) = X_i + \eta_i I \tag{9}$$

Where $y_i = (y_{i1},...,y_{iT})'$,ι is a $T \times 1$ vector of ones, and $X_i = (x_{i1},...,x_{iT})'$ is a $T \times k$ matrix. The implication of (2.8) for

$$E(v_i \mid x_i, \eta_i) = 0 \ (t=1, ..., T), \tag{10}$$

$$Var(v_i \mid x_i, \eta_i) = \sigma^2 I_T, \tag{11}$$

$$E(y_i / x_i, \eta_i) = X_i \beta + \eta_i I \tag{12}$$

the expected value of y_i given x_i is

$$E(y_i / x_i, \eta_i) = X_i \beta + E(\eta_i I \, x_i) I \tag{13}$$

under Assumption A2

$$Var(y_i \mid x_i, \eta_i) = \sigma^2 I_T \tag{14}$$

which implies

$$Var(y_i \mid x_i, \eta_i) = \sigma^2 I_T + Var(\eta_i \mid x_i) II' \tag{15}$$

In this thesis, we conduct an econometric analysis and estimate different models. We compare the results of these models based on four criteria: Akaike information criterion (AIC), corrected Akaike information criterion (AICc), Hannan-Quinn Information Criterion (HQIC), and Bayesian Information Criterion (BIC). These criteria are listed in order of the strength of their penalty, with AIC imposing the mildest and BIC the strongest penalty.

All of these criteria balance the trade-off between model goodness of fit and complexity, discouraging overfitting. However, some criteria impose a stronger penalty for model complexity. Lüthkepohl et al. (2004) analyzed various types of models and found that selecting the order of models requires considering different operators, deterministic terms, and distributional assumptions.

Model adequacy and reduction can be evaluated in the usual way. However, the presence of non-uniqueness in the parameters of an overspecified ARMA model can affect the estimators' asymptotic properties. Therefore, model selection procedures are often used to specify the orders. This perspective is further discussed in the context of pure AR models.

2.9.1. AR Order Specification Criteria

The general structure for many of the AR order-choosing criteria is as follows:

$$Cr(n) = log\sigma_u^2(n) + c_T\varphi(n), \tag{16}$$

Where function that punishes big AR orders is $\varphi(n)$, sequence indexed by the sample size is c_T, the estimator of error variance by taking ordinary least squares residuals of $u_t(n)$ as basis from order n AR model is $\sigma_u^2(n) = T^{-1}\sum_{t=1}^{T} u_t(n)^2$. In the context of criteria for this section, weighting factor dependent on the sample size is c_T and fitted process has the order of $\varphi(n)$.

How the factor is chosen is what differentiates the criteria from the others in effect. Having dependence on the size of sample, weighting factor of log $\sigma_u^2(n) + c_T$ is the

first term on the right-hand side. The selection of this factor differentiates the criteria.

For a model having an order n, the fit of a model is calculated by the first term on the right-hand side log $\sigma_u^2(n)$. As there is no correction for degrees of freedom in the variance estimator, the higher the order becomes, the lower the value this term takes.

It should be noted that the greatest order p_{max} determines the pre-sample value number defined for estimation since there is the assumption that size of the sample is non-changing for all orders n. For true AR order p, estimator p is selected by the objective of finding the order which makes the criterion minimum.

In practice, the following criteria are utilized:

$$AIC(n) = log\sigma_u^2(n) + \frac{2}{T}n \quad (Akaike(1973,1974)) \tag{17}$$

$$HQ(n) = log\sigma_u^2(n) + \frac{2logT}{T}n \ \ (Hannan\ \&\ Quinn(1979)) \text{ and} \tag{18}$$

$$SC(n) = \ log\sigma_u^2(n) + \frac{logT}{T}n \ \ (Schwarz(1978)\ and\ Rissanen(1979)) \tag{19}$$

c_T becomes log T/T for the Schwarz criterion (SC), 2/T for the Akaike information criterion (AIC) and 2loglogT/T for the Hannan-Quinn criterion (HQ). In case the true order is smaller than p_{max} and the actual DGP is a finite order AR process under general conditions, SC is strongly consistent, HQ estimates the order consistently and AIC asymptotically overestimates the order with positive probability.

These results are applicable for both integrated and stationary processes (Paulsen (1984). $\hat{p}(SC), \hat{p}(AIC)\ and\ \hat{p}$(HQ) indicating the orders chosen by each criterion, the following holds:

$$\hat{p}(SC) \leq \hat{p}(\text{HQ}) \leq \hat{p}(AIC), \tag{20}$$

Yum (2021) investigated the model selection criteria for fixed-effect panel data models. In this study, model selection criteria such as Bayesian Information Criterion (BIC), adjusted Akaike Information Criterion (AICc), and Akaike Information Criterion (AIC) for fixed effect panel data models are discussed. The research indicates that (AICc) and (AIC) in particular work well as long as the time dimension is not excessively small.

CHAPTER 3

THE ANALYSIS: DATA AND METHODOLOGY

The determinant of sovereign default is analyzed by different approaches by taking the changes after the 2008-2009 Global financial crisis into consideration. This perspective analyses regional differences' impact, systemic risk effect, and specific variables' impression on sovereign default into consideration. While the previous approach considers country-specific factors, the following approach concentrates on individual-based impacts on sovereign default. These research focused on the impression of firm-specific alteration on sovereign default. After presenting the country and individual-based factors, we begin to present sector-based researchthat analyze each sector's impact on sovereign default. These sectors consist of financial factors and macroeconomic indicators.

The literature examines the impact of various factors on the credit default swap spread, which is a measure of sovereign default risk. These factors are analyzed from different perspectives, such as macroeconomic, social, institutional, and political approaches. One research study that investigates the credit default swap spread as a measure of sovereign default risk is as follows:

While the 2008-2009 Global Financial crisis showed similar properties to previous crises, it has some differentiated causes and consequences for countries. The crisis affects both financial sectors and macroeconomic indicators; its devastating effects span various areas. The financial system has some problematic situations that turn into crises: initially, the specific variables' impact and then liquidity, systematic risk regional differences' effects are analyzed.

Altman et al. (2005) analyzed the impact of specific variables and found that these indicators have little to no contribution to explanatory power, or have incremental

statistical significance to the CDS spreads. During the crisis, many researchers identified systematic risk as the main reason for the global crisis. Li (2007) stated that the systematic risk proportion has a negative and significant effect on the CDS spreads, after including variables offered by theories of default risk and the existing empirical evidence.

In their 2006 analysis, Tang et al. explored the connection between liquidity and risk and how this affects the Credit Default Swap (CDS) spread. They discovered that liquidity proxies are useful in capturing different aspects of CDS liquidity and are significant factors in determining CDS spreads. During the Global Financial Crisis, it is unclear whether its impact on each country was similar or if regional differences had any impact on the determinants of sovereign default.

According to Hassan et al. (2013), there are regional variations that affect the determinants of credit default swap spreads. The study analyzes the determinants of credit default swaps (CDS) spreads in the United States, Europe, and Asia-Pacific markets. The research reveals both differences and similarities in the findings. The results from the United States and other countries confirm the evidence of a significant relationship between theoretical determinants of default risk and actual market pricing of CDS. The study also highlights the importance of macroeconomic and firm-specific variables, which are significant factors worldwide.

The text discusses the analysis of the determinants of credit default swap, starting with a country-wide impact analysis. The analysis then moves on to individual or firm-level analysis of credit default swap determinants. Ericson et al. (2004) conducted a study on firm leverage and found that firm leverage, volatility, and riskless interest rate are significant determinants of credit default swap spread, regardless of the econometric methodology used to calculate levels or differences. Blanco et al. (2005) conducted a periodic analysis of firm-specific indicators and found that CDS prices are better integrated with firm-specific indicators in the short run and with market variables in the long run.

Pu et al. (2010) conducted a study to examine the correlation between observable indicators and credit risk. First, they proved the significance of specific market

variables and estimated their impact evaluation for the short and long run. Then, they tested linearity and found that a linear combination of observable indicators from different levels, such as firm, industry, market, and macroeconomic factors, could not fully explain the correlation in credit risk. However, including higher order and interactive terms of the observable variables helped eliminate the correlation in regression residuals. This suggests that the relation between observable variables and credit risk is nonlinear.

As already mentioned, a lot of research has been conducted on the 2008-2009 Global Financial Crisis. It is widely accepted that the financial sector is a leading indicator of this crisis. Starting from the early 2000s, many researchers have analyzed the impact of equity returns on sovereign default. Goldstein et al. (2000) suggested focusing on equity returns as they found a significant correlation between equity return and sovereign default. Additionally, Hull et al. (2004) analyzed the effect of bond yield spreads and found that the relation between yield spread and credit default swap spreads is strong.

According to Imbierowicz's analysis in 2009, portfolio positions must be evaluated continuously and linked to their fundamental value to avoid risk mispricing. Current structural pricing models do not capture all essential factors on CDS. Therefore, it is essential to consider forward-looking macro-indicators, liquidity measures, and the incorporation of implied volatilities. The risk in the financial market is evaluated in the name of option-implied jump risk, which is a significant part of observed credit spread measured by CDS spread, according to Cremers et al. in 2008. Additionally, Longstaff et al. in 2005 analyzed the impact of corporate spreads and found that most of the corporate spread is due to default risk when applied to CDS data to obtain direct measures of the size of the default and non-default components in corporate spreads. This study provides estimations for all rating categories and riskless curves.
In a study conducted by Tang et al. (2008), the impact of macroeconomic indicators on CDS spreads was analyzed. The research showed that macroeconomic indicators have a significant influence on CDS spreads. Furthermore, this study supports the idea that the relationship between market conditions and firm-specific characteristics is critical.

Sovereign rating agencies use a set of criteria to evaluate the creditworthiness of countries, despite the infinite amounts of credit default swaps available. Mellios et al. (2006) conducted a study to analyze the factors that influence the sovereign credit ratings provided by the major rating agencies, including Fitch Ratings, Moody's, and Standard and Poor's. Their findings show that sovereign ratings are influenced by a country's per capita income, government income, fundamental exchange rate changes, inflation rate, and default history. The study also highlights the significance of corruption measures by Transparency International's Corruption Perceptions Index, which serves as a proxy for a country's economic development and the quality of its governance.

The question is how various factors impact the likelihood of sovereign default when considered together. Zhang et al. (2009) found that CDS spreads are significantly affected by volatility, jump risk measures, macroeconomic conditions, and a firm's balance sheet information.

While most research focuses on financial and macroeconomic indicators, few have studied exchange rate indicators as determinants of sovereign default. In this study, we examine the impact of exchange rate and sovereign rating on a group of countries with different types of economies (referred to as "all-countries" in this research) as well as emerging market economies, using recent contributions from Gadanecz et al. (2014).

3.1. The Exchange rate and Sovereign Default Spread

One of the most important topics in macroeconomics and finance is understanding sovereign debt and default. Despite efforts to identify economically motivated variables for sovereign default, research in financial economics has struggled to find such variables. A seminal study by Afonso (2002) highlighted this issue and since then, many researchers have looked for powerful variables or alternative econometric methods to better understand the significance of sovereign default variables.

It is challenging to identify reliable predictors for sovereign default due to the unsatisfactory performance of different types of variables. The motivation behind

investigating sovereign default is simple. Although traditional macro models consider exchange rate and currency risk as determining factors, recent research in economic fundamentals (such as Gadanecz et al. (2014)) has characterized it as a possibly more complex phenomenon.

Previous research has attempted to estimate the impact of exchange rate fluctuations on the transmission mechanism by proxying the exchange rate impacts. Researchers have attempted to estimate the exchange rate impact by analyzing its contribution to the channel. Previous studies have used future portfolio returns' net foreign assets and/or future current account surplus as a proxy for exchange rate impacts. These factors have also been defined as net exports to growth in literature. Additionally, external imbalances have been used to represent the exchange rate impact on the economy. Cross-sectional excess returns diversity has also been applied to measure the exchange rate effect on the economy.

The literature examines the valuation channel, which investigates currency risk and exchange rates. According to Gourichas and Rey (2007), external imbalances must anticipate future portfolio returns, net foreign assets, and/or future current account surpluses (net export growth). If a country currently has net external debt, its currency will definitely depreciate due to international financial rearrangements caused by the balance of a heating effect of the international budget constraint.

According to a study by Obsfeld and Rogoff (1995), the exchange rate is influenced by both bilateral trade and external assets and liabilities. For example, the net international investment position can transmit wealth from creditor countries to debtor countries. The study found that external imbalances can predict exchange rates one quarter ahead and beyond.

Numerous studies have used proxies to measure the impact of exchange rate risk on sovereign default. However, there are only a few studies that directly use exchange rates without any proxies as Gadanecz et al. (2014) did. In contrast to most of the existing literature, we will use the exchange rate without any proxy. In Gadanecz et al. (2014) research, sovereign default circumstances were proxied by sovereign bond yield. Similarly, the literature represents the sovereign default case by various types

of indicators such as sovereign debt to credit default swap spreads and sovereign spreads.

Recent research has focused on analyzing the behavior of markets towards crash risk, macroeconomic determinants such as the volatility of terms of trade, and financial fragility. These factors are well represented by sovereign debt/CDS spreads in terms of their statistical and economic significance. Some notable studies in this area include Back, Bandopadhyaya, and Du (2005), Hilher and Nosbusch (2010), and Ang and Longstaff (2011).

Recent research has focused on how the market behaves when there is a risk of a crash. Studies have looked at macroeconomic factors, such as the volatility of terms of trade, as well as financial fragility. These factors are all well represented by sovereign debt/CDS spreads in terms of their statistical and economic importance. For example, Back, Bandopadhyaya, and Du (2005) studied market behavior during a crash risk, while Hilher and Nosbusch (2010) looked at macroeconomic determinants. Ang and Longstaff (2011) examined financial fragility. Borri and Verdelhan (2011) found that sovereign debt/CDS spreads are a useful measure for all three factors.

According to research, the analysis of sovereign spreads can provide valuable information about various indicators. Specifically, sovereign spreads can give insight into external imbalances, currency risk premia in response to a nation's external adjustment, and global imbalances.

Sovereign spreads are a complex measure that considers the valuation of currency risk premiums in response to a nation's external adjustment. According to the research, sovereign spreads are influenced by various indicators, including global imbalances. The impact of global imbalances on the different indicators that appear with the transmission mechanism is analyzed in the report.

The article by C Durduabalerro, Farhi, and Gourinchas (2008) examines the global imbalances perspective and proposes an analytical framework that highlights the ability of countries to generate financial assets for global savers and insurers.

Other studies suggest that global imbalances are a crucial macroeconomic determinant of sovereign risk (Back, Bandopadhyaya, and Du (2005); Wu and Zhang (2008); Hilsher and Nosbush (2010); Durdu, Mendoza, and Terrones (2013)), and therefore, they are reflected in the pricing of CDS spreads (Pan and Singleton (2008); Longstaff, Pan, Pedersen, and Singleton (2011)).

According to Alvarez, Atkesenon, and Kehoe (2009), the risk premium of a currency pair is almost the same as its interest rate differential. This suggests a connection between currency premiums and sovereign credit risk, meaning that a country with a high risk of default tends to offer a higher interest rate to attract foreign savings to fund its external deficit.

Huang et al. (2012) examine the relationship between currency trades, position-unwinding risk, and their effects on sovereign credit premiums. Gourinchas and Rey (2007), as well as Cabarello, Farhi, and Gourinchas (2008), base their analysis on the theory of a country's external adjustment to global imbalances through the evaluation of exchange rates.

There are several studies that analyze the relationship between implicit sovereign default and recovery. Some of these studies focus on the term structure of interest rates (such as Cox, Ingersoll, and Ros in 1985), while others investigate forward premium anomalies (Backus, Foresi, and Telmer in 2000; Bekaert, Wei, and Xing in 2007; Ang and Chen in 2010).

In 2012, Huang et al. defined the "Joint (Affine) Term Structure Model." This model suggests that short-term interest rates imply a short-run market liquidity risk component, while short-run sovereign credit risk components are represented by the corresponding CDS spreads. The sovereign component shows the short-term rollover risk of maturing debt and refinancing constraints. Other studies (such as Acharya, Gale, and Yorulmazer in 2011 and He and Xiong in 2012) have analyzed the stock market in relation to this topic.

According to Huang et al. (2012), the currencies of countries that owe money to foreign creditors offer a risk premium to compensate for the possibility of defaulting

on their domestic borrowings, such as current account deficits. The advantage of using a country's Credit Default Swap (CDS) spreads to convey sovereign risk, rather than its Net International Investment Position (NIIP), is that the latter cannot be observed in monthly frequency. Although it is not feasible to exchange currencies based on their sovereign CDS spreads daily, the CDS market is highly liquid and is renowned for its efficiency in price discovery.

The connection between global imbalances and sovereign CDS spreads can be analyzed through the sovereign yield channel in both domestic and international economies. Sovereign CDS spreads are used to measure the links between various contributing factors including financial, macroeconomic, and institutional factors. While most research uses CDS spreads as a proxy for sovereign spreads, some studies use sovereign bond yield instead. Gadanecz et al. (2014) used sovereign bond yield in their path-breaking research.

Gadanecz et al. (2014) conducted a study on the impact of exchange rate risk on local currency sovereign bond yields in emerging market economies (EMEs). The study considered exchange rate expectations and measured the uncertainty around them, which is known as exchange rate volatility. The results showed that exchange rate risk has a significant impact on EME local currency sovereign bonds. When exchange rate volatility increases, investors demand a higher yield compensation for holding such bonds.

The research conducted by Gadanecz et al. (2014) is a valuable addition to the existing literature on the sovereign CDS market and exchange rate market. However, there are only a few studies that have explored the relationship between the sovereign CDS market and the FX market. This study aims to bridge this gap by examining this relationship further.

One notable exception is the paper by Gadanecz et al. (2014) that analyzes exchange rate risk in influencing local currency sovereign bond yields in emerging market economies (EMEs). However, our paper departs substantially from their work in four critical ways. First, whilst Gadanecz et al. (2014) investigate the impact of the

exchange rate factors on sovereign bond yields. Instead, we analyze the effect of exchange rate factors on sovereign default, which is proxied by credit default swaps. Secondly, Gadanecz et al. (2014) select their research data set with the guidance of previous studies. On the other hand, we take into consideration Alsonfo et al. (2003) research estimation results and combine the previous research consequences and then, we construct our data set from 3 major credit rating agencies: Standard and Poors, Fitch and Moody's with guidance of previous research outcomes under the restriction of the data availability. Thirdly, Gadanecz et al. (2014) research on 20 EMEs. However, we compose two different data sets, where the first set is defined as All countries that consist of 64 countries, that includes EMEs, developing, developed, financial centers, and non-financial centers, and the second set is defined as EMEs countries that include 30 major EMEs countries. Fourthly Gadanecz et al. (2014) work on a period that covers between 2005 and 2013, whereas our data set spans the period between 1995 and 2021.

This research aims to answer the following questions by exploring the controversial circumstances surrounding the exchange rate and its impact on sovereign default. Using a defined data set and techniques, we will determine whether the exchange rate has any influence on sovereign default and whether this impact varies by country type. We will also analyze the effect of the exchange rate regime on the link between the exchange rate and sovereign default, as well as the potential impact of capital openness on this relationship.

This section focuses on the literature that defines the determinants of sovereign default and the studies that analyze sovereign default and sovereign default risk. We will provide a brief summary of previous research and highlight the similarities and differences between our analysis and previous studies.

Table 10. Prior research variables and sample sets.

Reference	Variables	Samples
Detragiache and Spilimbergo (2001)	Multilateral share of debt, Interest rates, Overvaluation, Openness, Debt coming due,Foreign exchange reserves, Total debt to GDP ratio, Commercial share, Concessional share of debt, Short-term debt	Annual data on 69 countries, 1971–98

Table 10. continued

Catão and Sutton (2002)	Government balance over GDP, Openness, Real effective exchange rate, Volatility of fiscal policy, Short-term debt, Volatility of terms of trade, Foreign exchange control index, Volatility of money base coverage, Real GDP growth, Volatility of capital control, Real interest rate on U.S. bonds, Terms of trade, Foreign exchange reserves to debt ratio, Total external debt service to export ratio	Annual data on 25 emerging markets, 1970–2001
Kruger and Messmacher (2004)	Foreign debt to GDP ratio, Change in growth rate of terms of trade, Long-term debt service to reserves ratio, Export growth, U.S. three-month interest rate, Short-term debt to reserves ratio, Long-term debt service to reserves ratio, GDP growth, Debt to exports, Proportion of new financing needs, Debt to exports, Current account deficit to GDP	Annual data on 42 countries, 1970–2001
Kraay and Nehru (2006)	Debt service to revenues ratio, Debt service to reserves ratio, CPIA rating, GDP growth, Present value of debt to exports ratio, Rule of law, Depreciation, Terms of trade growth, GDP per capita, Inflation	Data on 94 crisis episodes in low-income countries, 1970–2001
Pescatori and Sy (2007)	Overvaluation, GDP growth, Inflation, Total debt to GDP ratio, Short-term debt over reserves ratio, Openness	Several samples, 1975–2002
Tomz and Wright (2007)	GDP (Hodrick-Prescott filtered)	Annual data on 106 countries, 1820–2004
Cantor and Packer (1996)	Per capita income, GDP growth, Inflation, fiscal balance, external balance, external debt, indicator for economic development, indicator for default history, Moody's, S&P or average ratings, spreads	Annual data on 35 countries, 1970-1995
Altman (2005)	Working capital/total assets, Retained earnings/total assets, operating income/total assets, book value of equity/total liabilities.	Annual data for 30 Mexican Corporations, 1994-2005
Cayon and Perilla (2018)	Credit default spreads of specific company, financial indicators as (free cash flows, working capital, EBIT, and retained earnings), DEBT as(current liabilities, total debt to assets, net debt and free cash flow to total debt, TAN(property, plant, and equipment, total debt to tangible assets, inventories, total liabilities to tangible book value, and fixed assets to long term investments, MKTE(bond yield of the previous year, annual variation of the weighted average market value portfolio of the total bonds issued by a specific company.	Annual data for 50 Latin American companies, 2006 and 2016
Hilscher and Nosbush (2010)	Volatility of terms of trade, change in terms of trade, years since last default, VIX index, Default yield spreads (DEF), Treasury 10-year yield (r_ 10 years) TED spread (TED), Debt/GDP, Credit rating, Instrument for terms of trade, regional effects, year effect	Annual data for 32 Emerging Market Economies, 1998-2007
Kahıloglları (2018)	Credit default swaps, portfolio investments, foreign direct investments	Annual data for Turkey,2005-2017
Gadanecz (2014)	One year a head exchange rate forecast, implied exchange rate volatility, short rate forecast, inflation forecast, GDP growth forecast, fiscal balance forecast, local currency sovereign credit ratings, foreign currency sovereign CDS spreads, share of foreign. Holdings, VIX Index, US term premia	Monthly data spanning from 2005 to December 2013, 20 major EMEs.
Verma (2002)	Growth rate of GDP, Interest/Exports, Real Interest rate, Total external debt/GNP, Libor, Budget surplus/GDP, Growth rate of Industrial countries, Political factors, (democracy index, political freedom index, pluralism, party fractionalism index)	30 countries for 20 years.
Boumparis and Milas and Panagiotidis (2017)	GDP per capita, Government debt, current account balance, inflation rate, unemployment rate, regulatory quality index.	19 Eurozone countries, annual data from 2002 to 2015

Table 10. continued

Teixeira and Francisco and Silva (2017)	Macroeconomic variables (GDP per capita), GDP growth (%), unemployment (%), inflation (%), investment (%), External Variables (external debt (%), deficit in the current account (%), reserves, terms of trade, liquidity risk, (government Variables); government debt (%), fiscal balance (%), Qualitative variables, default, corruption index, political stability index	86 countries, annual data for 1993-2013.

According to Cantor et al. (1995), sovereign credit rating is an essential factor in determining a country's access to international capital markets. Depositors, especially those in the US, prefer rated securities over unrated ones of the same risk.

The research suggests that macroeconomic fundamentals, particularly financial indicators, are closely related to sovereign credit rating. Cantor et al. (1995) highlight that sovereign credit rating receives significant attention in the financial and press sectors because it largely represents the arraying of risk, which is determined by macroeconomic fundamentals.

Moody's and Standard and Poor's evaluate sovereign ratings based on six significant factors that play a crucial role in determining a country's rating. These factors include per capita income, GDP growth, inflation, external debt, level of economic development, and default history.

According to Alsakka et al. (2011), signals from rating agencies do affect the exchange region of the respective countries. The study found that negative news from all three major agencies has an impact, but only positive news from Moody's elicits a reaction. Negative news from Fitch has the strongest effect. These findings provide valuable insights into the role of rating agencies and how the market responds to their signals. The study's main objective was to estimate the general results of sovereign default and sovereign default risk for different countries.

In this section, the analysis focuses on two main country groups: all countries and EMEs. The variables were selected from the three major credit rating agencies, namely Fitch Ratings, Moody's, and Standard and Poor's, based on previous research and data availability restrictions, following Afonso's (2003) methodology.

Based on data restrictions, we have determined the factors that influence the economy by referring to Moody's, Standard and Poor's, and Fitch. These factors fall

under three main categories: exchange rate factors, domestic factors, and international factors.

We have analyzed various exchange rate factors, such as the official exchange rate and exchange rate volatility. Domestic factors have been represented by GDP, inflation, claims on the private sector, external debt stocks to GNI, FDI to GDP, Official reserves to GDP, and the Current Account Balance to CARS(%). International factors have been represented by weighted averages of World Governance Indicators and VIX, which is a real-time index that represents the market's expectations for the relative strength of near-term price changes of the S&P 500 Index.

To investigate the relationship between exchange rates and credit default swaps, we conducted an analysis by modeling credit default swaps. Our modeling technique follows the method used by Jaramillo and Weber (2013 a, 2013 b), Miyajima et al. (2014), and Gadanecz et al. (2014). Gadanecz et al. (2014) conducted research on the role of exchange rate risk in influencing local currency sovereign bond yields in emerging market economies (EMEs). They applied the model to analyze the relationship between domestic currency sovereign bonds and the exchange rate for EMEs.

Most of the empirical literature evaluates static panel data models and applies standard fixed/random effect procedures for estimation. However, this approach ignores heteroscedasticity and autocorrelation problems. In this section, we also considered potential autocorrelation and heteroscedasticity issues. We used the panel data fixed effects model to estimate our equation, as this model controls for omitted variables in panel data when the omitted variables vary across states but do not change over time.

The vast of the literature that researches sovereign default applies panel data fixed effect (as Gadanecz et al. (2014).) On the other hand, Xu (2007) argues between the fixed effects and random effects model, stating that the model used to apply is a critical issue. Baltagi (2001) claims that the fixed effects model assumes that the

unobserved heterogeneity (ai) is linked with the explanatory variables (xitk), that the random effects model does not. As a result of this, the choice between the fixed and the random effects models depends on whether or not the ai is correlated with the xitk.

A significant number of researchers as Wooldridge (2006) estimate both random and fixed effects and then test statistics of the differences in the coefficients on the time-varying explanatory variables. In addition to this, a specification test is developed by Hausman, that is usually applied to decide between fixed and random effects models. Greene (2003) states that the Hausman test compares the fixed versus random effects under the null hypothesis that the individual effects (ai) are independent of the other explanatory variables in the model. In the case of, the null hypothesis is not rejected, then it is chosen to use random effects as it produces more efficient estimators. But if it is rejected, the fixed effects model is better than the random effects.

We used the Hausman test to determine which technique was appropriate for the researched question in all countries and EMEs analysis. The estimation results of the Hausman test for the all-countries data set showed that the fixed effect model was suitable for the models that analyze domestic factors, domestic factors and exchange rate factors together, and exchange rate factor, domestic factors, and international factors all together. However, the case was different for the EMEs country data set, where the fixed effect model was appropriate for estimation when both exchange rate factors, domestic factors, and international factor analysis were applied, depending on the Hausman test procedure.

Fixed effects regression is a method for analyzing omitted variables in panel data when the omitted variables vary across states but do not change over time. The estimators obtained from panel data are unbiased and consistent. In estimation, one type of HAC standard errors used are clustered standard errors.

The term "clustered standard errors" refers to a statistical method that allows for regression errors to have any correlation within a cluster or grouping, but assumes that the errors are uncorrelated across clusters. This means that clustered standard

errors can account for heteroscedasticity and arbitrary autocorrelation within a state or country, but treat the errors as uncorrelated across entities or countries. Clustered standard errors are valid regardless of whether there is heteroscedasticity, autocorrelation, or both.

Our aim is to control for country-specific factors' effect on credit default swaps, using a similar approach to previous research by making estimations using panel fixed effects regression. We use unbalanced panel data for 30 major emerging market economies and 64 countries, including advanced, emerging, and developing countries, as well as financial and nonfinancial centers. Our analysis is based on yearly data from January 1995 to December 2021. We estimate the following equation in our analysis:

The dependent variable, y, uses the natural logarithm of the five-year credit default spread. In 2006, the IMF reported that credit default swap spreads were being used as indicators of bank credit risk and the market's "collective view of credit risk". However, like bond spreads, CDS spreads can also reflect other factors such as a liquidity premium, systematic credit risk, or risk aversion. Annaert et al. (2010) conducted research on the determinants of bank CDS spreads. They found that these determinants vary significantly over time. Their second result showed that structural credit risk became a significant driver of CDS spreads mostly after the start of the crisis, as shown by the rolling regressions. Thirdly, CDS market liquidity appears to play a role in explaining Euro area bank CDS spread changes, both before and after the start of the crisis, as evidenced by the Rolling regressions.

The definition of credit default swap (CDS) spread varies based on different perspectives. According to Vogelheim (2020), CDS spreads of European banks rose sharply during the global financial crisis and Euro crisis. However, this increase cannot solely be attributed to default risk.

A CDS is a credit derivative that allows the protection buyer to transfer the credit risk of a reference asset to the protection seller by paying a periodical CDS premium. If a predefined credit event occurs, the protection buyer will receive compensation

payment. Apart from default risk, empirical CDS spreads compensate risk-averse investors for liquidity risk and common spread risk.

According to research carried out by Völz et al. (2011), Raunig (2015), Hasan et al. (2016), and Samaniego et al. (2016), the factors that determine the credit default swap (CDS) spread of a bank include the EDF(DD), leverage, equity return, and equity volatility. These studies found that these fundamental model-based credit risk factors are statistically significant and economically important determinants of bank CDS spreads.

In financial terms, a credit default swap spread is an agreement between two parties - the protection buyer and the protection seller - as described by Brigo et al. (2005). The purpose of this agreement is to transfer the financial loss that the protection buyer would suffer if a particular default event happened to a third party, known as the reference entity, to the protection seller.

The buyer of a protection pays a rate R at specific times, Ta+1 through Tb, and the payments end if a default occurs. The seller of protection agrees to make a single payment, LGD, if the pre-specified default event happens between Ta and Tb. These contracts, with some variations in the payoff definition, represent the most liquid credit derivative market. To create a market model in credit risk, it is natural to start with a conventional definition of CDS.

By considering the credit default spread, we can measure the CDS level using 1-, 5-, and 10-year sovereign CDS spreads. We chose these durations because they are commonly used in numerous models on CDS, and the central modeling quantity is the log credit spread. (See Gordy and Willemann, 2012; Gordy and Szerszen, 2015) We also considered statistical tests in our analysis, and using logs of credit spreads is necessary to control for heteroscedasticity, given that the distribution of raw credit spreads is highly skewed.

$$y_{i,t=}\alpha_t+\beta*Exch_{i,t}+\delta*Exch_V_{i,t}+\phi*GDP_{i,t}+\gamma*\mathrm{Inf}_{i,t}+\eta*Prvte_{i,t}+\varphi*E_debt_{i,t}+\lambda*FDI_{i,t}+\mu*Resrvs_{i,t}+\pi*Gov_d_{i,t}+\theta*CA_{i,t}+\rho*WGI_{i,t}+\sigma*\mathrm{Vix}_{i,t}+\varepsilon_{i,t} \quad (21)$$

i) Exchange Rate factors

Exch- Official Exchange Rate (LCU per US Dollar) from 1985
Exch_V- Exchange Rate Volatility (LCU per US Dollar)

ii) Domestic Factors

GDP - GDP per capita growth (annual %)
Inf - Inflation, consumer prices (annual%)
Prvte- Claims on private sector (annual growth as% of broad money)
E_debt- External Debt Stocks to GNI
FDI- Foreign Direct Investment to GDP
Resrvs- Official reserves to GDP
Gov_d- General Government Debt to GDP
CA- Current Account Balance to Cars (%)

iii) International Factors

WGI- World Governance Indicators
Vix- *Volatility Index*

Table 11. Explanatory Variables Expected Signs.

Explanatory variables and expected signs of coefficients				
Group	*Exchange Rate*	*Domestic*		*International*
Variable	**Official*	**GDP per capita growth*	-	**World* +
	Exchange	**Inflation, consumer prices*	-	*Governance*
	+	**Claims on private sector*	+/-	*Indicators*
	Rate	**External Debt Stocks to GNI*	+	** Vix* +
	**Exchange*	**FDI- FDI to GDP)*	+/-	
	Rate +/ -	**Official reserves to GDP*	_	
	Volatility	**General Government Debt to GDP*	+	
		**Current Account Balance to Cars (%)*	+	

The data set is divided into three main categories as exchange rate factors, domestic factors, and international factors. The main categories have the variables obtained from World Bank, except VIX, which can be defined as follows:

The Official Exchange Rate (LCU per US Dollar) data covers the years from 1995 to 2021 for all countries, including emerging countries. This data refers to the exchange

rate determined by national authorities or the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages.

Exchange Rate Volatility (LCU per US Dollar) was calculated using the Exchange Rate (LCU per US Dollar). For the analyzed period between 1995 and 2021, the method applied by S&P for calculating exchange rate volatility was utilized. This method takes time as an interval (t and (t-9)).

The annual percentage growth rate of GDP per capita based on constant local currency is represented by GDP per capita growth (annual %). GDP per capita is calculated by dividing the gross domestic product by mid-year population. GDP at purchase prices comprises the gross value added by all resident producers in the economy, along with product taxes and minus any subsidies not included in the value of the products. It is calculated without any deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources.

The consumer price index reflects the annual percentage change in the cost of acquiring a standard basket of goods and services by an average consumer. This measure of inflation can be fixed or changed at specified intervals, such as yearly.

Private sector claims refer to the total amount of credit extended by the financial system to individuals, enterprises, non-financial public entities, and financial institutions that are not included elsewhere, under net domestic credit.

External Debt Stocks to GNI is the measure of total external debt owed to non-residents, which is payable in currency, goods, or services. It is calculated as the sum of public, publicly guaranteed, private non-guaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debts that have an original maturity of one year or less, as well as any interest in arrears on long-term debt.

GNI (formerly GNP) is calculated as the sum of value added by all resident producers, plus any product taxes that are not included in the valuation of output, and net receipts of primary income from abroad.

Foreign Direct Investment to GDP is the amount of investment that flows into a foreign economy to acquire a controlling interest (10 percent or more of voting stock) in an enterprise. This investment includes equity capital, reinvestment of earnings, other longer-term capital, and short-term capital, as recorded in the balance of payments.

Official reserves to GDP refer to the total reserves held by the monetary authorities, including monetary gold, special drawing rights reserves of IMF members held by the IMF, and foreign exchange holdings.

General Government Debt to GDP is a measure of the government's debt level in relation to its revenue. It is calculated by subtracting government expenses and net investment in nonfinancial assets from government revenue. It also includes transactions related to financial assets and liabilities. Net Lending/Net Borrowing is an indicator of the government's financial resources generation or utilization, showing the extent to which the government is providing financial resources to other sectors in the economy or borrowing from them.

The Current Account Balance is a measure of a country's trade balance. It takes into account the net exports of goods and services, net primary income, and net secondary income. Current Account Receipts (CARs) are the sum of net secondary income (net current transfers from abroad), compensation of employees (current LCU), and export of goods and services.

World governance indicators are used to assess how well a country is governed. These indicators include data about control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, the rule of law, voice, and accountability for analyzed countries.

VIX is an index that shows the market's expectations for the relative strength of near-term price changes of the S&P 500 Index.

In this thesis, the credit default swap spread (CDS) is analyzed as a composite index that estimates a country's diverse sectors, including both real and financial sectors. The real sectors cover production and consumption areas, while the financial sectors span diverse areas of finance. This study considers both the financial and real sectors, unlike the research done by Gadanecz et al. (2014) which only focused on the financial sector. The study aims to answer the question of whether the literature has ever used VIX as an explanatory variable to predict CDS, given that both of these indicators are used to measure market risk.

The official exchange rate sign coefficients are positive, and the exchange rate volatility can be both positive and negative depending on the research contributions of Gadanecz et al. (2014) in the context of emerging market economies. The literature has not precisely researched claims on private sector debt. However, the impacts of public debt and private sector debt have been analyzed in the literature, and the results have been both negative and positive.

According to Mellios et al. (2006), the theory suggests that external debt stocks to GNI, general government debt to GDP, current account balance, world governance indicators, and variables related to them positively affect credit default swaps. Conversely, GDP per capita growth, inflation, and official reserves to GDP negatively affect credit default swaps.

According to various studies, it has been found that foreign direct investment (FDI) does not have a significant impact on the credit default swap. For instance, Nordela's research conducted for the period of 1984-1996 showed a negative directional relationship between country risk and foreign direct investment.

Similarly, Bevan and Estrin's study for the period of 1994-1998 concluded that there was an insignificant relationship between country risk and foreign direct investment in transition economies of Europe. On the other hand, Hilscher et al.'s research found that the VIX has a positive impact on sovereign default by increasing sovereign yield spreads.

3.2. Regression Results

In our analysis of credit default swaps, we estimate different specifications that include exchange rate, domestic, and international factors for all countries and emerging market economies.

In Table 12, model number 1 gives the fixed effect panel model estimation results that represent the case of exchange rate factors are exogenous determinant factors for credit default spread, separately from the international and domestic determinant factors. The following model number 2 presents the fixed effect panel model estimation results that show the case of international factors separate from the exchange rate and domestic factors. Model number 3 gives the fixed effect panel model estimation results that analyze domestic factors apart from exchange rate factors and international factors. Model number 4 reports the fixed effect panel model outputs of the case of exchange rate factor and domestic factors are exogenous determinant factors of credit default swaps together. Model number 5 reports the fixed effect panel model estimation results, in which the exchange rate factors, domestic factors, and international factors are simultaneously determinant factors of credit default swap.

The analysis involves using five different models for estimating data across all countries. These models are then compared based on their prediction errors, using two statistical analyses. The first analysis is the Akaike Information Criteria (AIC). According to Stoica et al. (2004), AIC estimates the prediction error and provides a relative quality of statistical models for a given set of data. It calculates the quality of each model individually and comparatively to each other model, which supports the selection of the best model. AIC targets to present the process that constructs the data, but since the representation is not exact, some knowledge is lost by estimating the model. AIC estimates the ratio of information lost by a model, and the less information a model loses, the higher the quality of that model. While calculating the information lost, AIC considers both the goodness of fit and the simplicity of the model, which helps in dealing with the trade-off between the risk of overfitting and the risk of underfitting.

We applied a second statistic called the Bayesian Information Criteria (BIC) or Schwarz Information Criterion (SIC) to select the best model among a finite set of models. Usually, the models with lower BIC are preferred. BIC is based on the likelihood function and is closely related to another criterion called Akaike Information Criterion (AIC).

BIC and AIC are statistical methods aimed at increasing the maximum likelihood by introducing parameters. However, the addition of parameters can lead to overfitting, which is a common problem in estimation outputs. To address this issue, BIC and AIC include a penalty term for the number of parameters in the model. The penalty term is more significant in BIC than in AIC for sample sizes greater than 7.

According to Table 12: Fixed Effect panel model of Credit Default Spread in All Countries, we estimate five different models. Both information criteria AIC and BIC are estimated. It was obtained that for all the information criteria model 5 gives the best estimation result as both criteria give lower results according to the evaluation of the all-countries group. That means model five gives the more trustable outputs among models 1, 2, 3, and 4.

In this way, it is possible to check the stability of coefficients before arriving at a fully specified model, which includes all three sets of determinants.

The data set for domestic and exchange rate factors is obtained from the World Bank. The all-countries set includes some unions, especially the European Union. The World Bank data set has some restrictions for these countries, for instance, the exchange rate data. In that sense, it is possible to make a comparison for all countries and EMEs by comparing model 1 and model 6.

Table 12 presents that, in the case of all countries, the Official Exchange Rate (LCU per US Dollar) from 1985 has a negative and significant impact on credit default swaps. This result was obtained when analyzing exchange rate factors, domestic factors, and international factors both separately and together. An increase of one percentage point in the analyzed exchange rate is associated with a fall of 0.0006

basis points in credit default swaps. Additionally, the impact of inflation on consumer prices is also robust, as inflation forecast accounts for at least some of the elements underlying exchange rate forecasts.

Regarding the coefficients on domestic and international factors, those on inflation, claims on the private sector, external debt stocks to GNI, FDI to GDP, and official reserves to GDP are consistently significant and largely stable in magnitude across different models.

While all these indicators are significant and largely stable; each contributing factors show the difference as follows: The FDI to GDP ratio has the greatest marginal effect and conversely claims on the private sector has the lowest for all domestic and international factors that are involved in Model 3, Model 4 and Model 5. Then, it showed that external debt stock's absolute contribution value is higher than inflation, and consumer prices.

When inflation increases by 1%, the credit default swap increases by 2-3 basis points. On the other hand, if there is a 1% increase in claims on the private sector, there is a reduction in credit default swaps by 1-2 basis points.

If external debt stocks to GNI increase by 1%, credit default swap spreads rise by 1.811 basis points. Similarly, if the FDI ratio increases by 1%, credit default swap spreads increase by 7.494 basis points. Finally, if the official reserves to GDP improve by 1%, there is a 3.74 basis points reduction in credit default swaps.

Regarding international factors, the coefficient on the VIX positively and significantly affects credit default swaps. This finding holds true even for models including exchange rate forecasts, domestic and international factors separately and together.

International factor group indicators indicate differences in their impact on credit default swaps, both positively and negatively. The World Governance Indicators consistently have a negative impact, while VIX contributes positively in a stable

manner. The marginal contribution of World Governance Indicators ranges from -0.0002 to -0.00072. On the other hand, a 2-3 basis point increase in credit default swaps is associated with a percentage point increase in implied VIX, with values of 0.0481 and 0.0269 for the analyzed models.

In assessing the model depending on different factors groups, such as exchange rate factors, domestic factors, and international factors, the following results appear: Exchange rate factors in model 1 have a positive impact only when analyzed as a single factor group. In model 4, when exchange rate factors are analyzed together with domestic factors, their impact shows differences as the official exchange rate has a statistically significant and negative impact on credit default swaps while exchange rate volatility has a positive impact. In Model 5, when exchange rate factors are analyzed together with both domestic factors and international factors, the factors' behaviors show differences as the official exchange rate is a negative and statistically significant determinant factor of credit default swap and exchange rate volatility is a positive determinant of credit default swap.

The exchange rate factors have a similar behavior to the one reported by Gadanecz et al. (2014). The exchange rate negatively contributes to sovereign default, while exchange rate volatility positively affects it. This result is due to the transmission mechanism described by Huang et al. (2012), which starts from global imbalances to sovereign yield. It is argued that debtor countries' currencies offer risk premia to compensate foreign creditors who intend to finance domestic defaultable borrowing and current account deficit. The CDS market is known to be liquid, supporting the efficiency in price discovery.

In the case of the international factors' impact analysis, in model 2, only the impact of international factors is estimated, and in model 5, the analysis is estimated together with exchange rate factors and domestic factors. The international factors consist of World governance indicators and VIX. The averages of World governance indicators have negative impacts on credit default swaps in both model 2 and model 5. VIX impacts as a positive and statistically significant determinant factor of credit default swap in both model 2 which is analyzed as a sole factor group and in model 5, where the estimation is done with exchange rate factors and domestic factors.

Our estimation results are in a similar vein to Verma (2002) in reporting the impact of institutional factors that are proxied by world governance factors. The international factors group includes VIX's impact as another factor, and consistent with its contribution in Gadanecz et al. (2014) in each analyzed case the indicator keeps its significance. This appears because of the statement of Durduabalerro et al. (2008) as global imbalances highlight the country's capability to generate financial assets.

The following text explains the analysis of domestic and international factors on credit default swaps. Both model 3, analyzed as a single group, and model 5, analyzed with exchange rate and international factors, were considered. When analyzed as a sole group, GDP per capita growth is a negative determinant factor of credit default swaps in model 3. However, when analyzed with exchange rate and international factors in model 5, GDP per capita growth is a positive determinant factor. Inflation is a positive and statistically significant determinant factor for both model 3 and model 5, while claims on the private sector is a negative and statistically significant determinant factor.

The domestic factor group is the largest group in the estimation, and its significant coefficient amount suggests that domestic factors are important in the analysis, which is consistent with the findings of Gadanecz et al. (2014).

External debt stocks to GNI, FDI to GDP, and official reserves to GDP have a positive, statistically significant impact, while general government debt to GDP has a negative effect on estimating credit default spread in both model 3 and model 5. Current Account Balance to Cars (%) is a negative determinant factor of credit default swaps for both model 3 and model 5.

These results are similar to Boumparis et al. (2017) in terms of the significant impact of macroeconomic factors on sovereign default. This is possibly due to the fact that risk pricing and present structural pricing models do not capture all essential factors on CDS, and hence, it is necessary to introduce macro-indicators and liquidity measures as stated by Inbierowicx (2009).

The estimation results for all countries indicate that despite some data restrictions in the dataset, the reported estimation results are similar to the majority of sovereign research. This research successfully presents the relationship between exchange rate factors, domestic factors, and international factors. Although the results are similar to previous research, it is still possible to improve the estimation by increasing the observations within the same time interval.

The official exchange rate is the significant determinant factor of exchange rate factors in the analysis done with domestic factors and international factors. Inflation, claims on the private sector, external debt stocks to GNI, FDI to GDP, and official reserves to GDP are significant determinant factors that affect the credit default swap of domestic factors both for single analysis and the analysis which includes exchange rate factors and international factors.

VIX is a significant determinant of credit default swap spread for both single analysis and the analysis that includes exchange rate factors and domestic factors.

Table 12. Fixed Effect panel model of Credit Default Spread in All Countries

Fixed Effect panel model of Credit Default Spread in All Countries January 1995-2021					
Model Number	*1*	*2*	*3*	*4*	*5*
Exchange Rate Factors					
Official Exchange Rate (LCU per US Dollar) from 1985	0.00002 (0.00005)	-	-	-0.00065** (0.00026)	-0.0006*** (0.00024)
Exchange Rate Volatility (LCU per US Dollar)	0.00017 (0.00021)	-	-	0.00145 (0.00108)	0.00135 (0.00098)
Domestic Factor					
GDP per capita growth (annual %)	-	-	-0.01074 (0.01067)	-0.01118 (0.01056)	0.01452 (0.01015)
Inflation, consumer prices (annual%)	-	-	0.03406*** (0.00559)	0.03295*** (0.00556)	0.0262*** (0.00518)
Claims on private sector (annual growth as% of broad money)	-	-	-0.01096** (0.00406)	-0.0107** (0.00403)	-0.01214** (0.00391)

Table 12. continued

External Debt Stocks to GNI	-	-	1.49565*** (0.26966)	1.60623*** (0.27339)	1.81103*** (0.25557)
FDI to GDP	-	-	6.89723*** (1.38481)	6.84153*** (1.37117)	7.49494*** (1.27739)
Official reserves to GDP	-	-	-3.94242*** (0.57905)	-3.70651*** (0.58098)	-3.74763*** (0.5372)
General Government Debt to GDP	-	-	-0.01601 (0.01381)	-0.01489 (0.01368)	-0.01659 (0.01253)
Current Account Balance to Cars (%)	-	-	-1.67689 (1.02893)	-1.64702 (1.01922)	-1.33241 (0.93811)
International Factor					
World Governance Indicators	-	-0.00020 (0.00031)	-	-	-0.00072 (0.00066)
V_vix	-	0.04481*** (0.00389)	-	-	0.02693*** (0.00364)
Constant	4.77879***	3.6519***	5.39432***	5.37707***	4.74662***
Number of observations	888	1067	263	263	254
Adjusted R2	0.06246	0.06193	0.42805	0.4401	0.53053
F Value	0.000	0.000	0.000	0.000	0.000
Akaike Information Criteria	2104.411 (888)	2771.802 (1.067)	1101.536 (561)	1102.837 (561)	982.0586 (540)
Bayesian Information Criteria	2118.778 (888)	2786.72 (1.067)	1136.174 (561)	1146.135 (561)	1033.557 (540)
Hausman Test with random effect	0.4620	0.1727	0.0000	0.0000	0.0000

Source: Authors calculation

According to Table 13: Fixed Effect panel model of Credit Default Spread in EMEs Countries, we obtained five different models. Both information criteria AIC and BIC are calculated for models. It holds that for both information criteria model 5 gives the best estimation result, as both criteria' results become lower depending on the evaluation of both information criteria for the all-countries group going from model 1 to model 5. Similarly, model ten gives more trustable results considering models 6,7,8,9 and 10.

For cases in emerging countries, credit default swaps are negatively and significantly affected by the exchange rate. Exchange rate risk, which is proxied by the implied volatility of the exchange rate, has a positive and significant effect on credit default swaps, even for models that have exchange rate factors, domestic factors, and international factors separately or together.

A one percentage point increase in the implied exchange rate is associated with a 0.62-0.66 basis point decrease in credit default swaps. Exchange rate volatility has a positive and significant effect on credit default swaps, even for models that have exchange rate factors, domestic factors, and international factors separately or together. The marginal contribution value of exchange rate volatility takes the values of 00275, 0.00174, and 0.00161. The highest marginal value of exchange rate volatility is observed in the subset of exchange rate factors, while exchange rate volatility gets its lowest marginal value when analyzed in exchange rate, domestic, and international factor groups.

These estimations coincide with the report of Gadanecz et al. (2014), which also found a positive impact of exchange rate volatility.

In Table 13, model 6 gives the fixed effect panel model estimation results that represent the case of exchange rate factors are exogenous determinant factors for credit default spread, separately from the international and domestic determinant factors. The following model 7 presents the fixed effect panel model estimation results that show the case of international factors separately from the exchange rate and domestic factors.

Model 8 provides the fixed effect panel model estimation results that analyze domestic factors apart from exchange rate factors and international factors. Model 9 reports the fixed effect panel model outputs for the case of exchange rate factor and domestic factors are exogenous determinant factors of credit default swaps together. Model number 10 reports the fixed effect panel model estimation results, in which the exchange rate factors, domestic factors, and international factors are simultaneously determinant factors of credit default swap.

After analyzing all the models, the following results were obtained for the selected explanatory variables. The growth of GDP per capita has a positive and statistically significant impact, especially in the analysis with exchange rate and international factors. A one percentage point increase in GDP per capita is associated with a 2-3 basis point rise in credit default swaps.

In contrast, General Government Debt to GDP has a negative and statistically significant impact in the analysis with exchange rate and international factors. A one percentage point increase in General Government Debt to GDP is associated with a 58-59 basis point decrease in credit default swaps.

When considering the coefficients, inflation, claims on the private sector, external debt stocks to GNI, FDI to GDP, and official reserves to GDP are different from the all-countries case in the case of domestic and international factors. However, the coefficient of Current account balance to CARS is consistently significant and largely stable in terms of magnitude across different models.

Inflation has a significant impact on credit default swaps, with a one percent rise causing an increase of 31 basis points. On the other hand, a one percent increase in claims on private sector claims cause a fall by a 1-2 basis point in default swaps.

It has been observed that a 1% increase in external debt stocks to GNI leads to a rise of 2.168 basis points in credit default swap spreads. Similarly, a 1% increase in FDI ratio results in an 8.854 basis points increase in credit default swap spreads, while a 1% improvement in official reserves to GDP leads to 3.329 basis points in credit default swaps. Additionally, a 1% change in the current account balance CARS ratio causes a depreciation in credit default swap by 2.519 basis points. These results are consistent with the findings of Teixeira et al. (2017), who investigated and demonstrated the significant impact of macroeconomic indicators on sovereign default.

Upon analyzing the international factors separately, it has been observed that the world governance indicators consistently have a positive contribution. Additionally, the impact of VIX on credit default swaps is positive in all the analyzed groups.

In terms of international factors, the World Governance Indicators negatively affect sovereign default in each model analyzed. On the other hand, the coefficient of VIX significantly and positively affects credit default swaps. This finding holds true even for models with exchange rate forecasts, as well as for domestic and international

factors analyzed both separately and together. An increase in the implied VIX percentage is associated with a 2-4 basis point improvement in credit default swaps. Our international factors contribution, especially the impact of VIX, is similar to the result obtained by Gadanecz et al (2014) as the indicator maintains its significance in all the analyzed groups.

Regarding the assessment of the model based on different factor groups, including exchange rate factors, domestic factors, and international factors for EME countries, the following conclusions can be drawn:

In model 6, the exchange rate factors for EME countries are estimated by only one group. According to the analysis of this model, the official exchange rate is a negative and statistically significant determinant factor of credit default swap. Moreover, exchange rate volatility is a positive and statistically significant determinant factor of credit default swap.

In model 10, exchange rate factors estimate credit default swap with both domestic and international factors. In this model too, the official exchange rate is a negative and statistically significant determinant factor of credit default swap. Similarly, exchange rate volatility is a positive and statistically significant determinant factor of credit default swap.

In these researched groups, the exchange rate has the highest marginal contribution obtained in the model of exchange rate factors, which decreases its marginal contribution. The lowest contribution is reached in the analysis that includes exchange rate factors, domestic factors, and international factors.

Exchange rate volatility has the highest impact when analyzed within exchange rate factors. However, it has the lowest marginal impact in the analysis that includes exchange rate factors, domestic factors, and international factors.

In the case of the international factors for EME countries are analyzed in model 7, only the impact of international factors is estimated; and in model 10, the analysis

makes estimation together with exchange rate factors and domestic factors. The international factors consist of World governance indicators and VIX. The averages of World governance indicators have negative impacts on credit default swaps in both model 7 and model 10. VIX is analyzed as a positive and statistically significant determinant factor of credit default swap in both model 7, which is analyzed sole group, and in model 10, where the estimation is done with exchange rate factors and domestic factors. The world governance indicators have the highest negative effect in the case of it is analyzed in international factors and Vix has its highest marginal impact in the case of it is analyzed in international factors.

In models 8 and 10, domestic factors affecting emerging market economies (EMEs) were analyzed. In model 8, GDP per capita growth was found to be a negative determinant factor of credit default swaps when analyzed independently. However, in model 10, where domestic, exchange rate, and international factors were analyzed together, GDP per capita growth was found to be a positive and statistically significant determinant factor of credit default swaps. Inflation was found to be a positive and statistically significant determinant factor of credit default swaps in both models.

Claims on private sector were found to be a negative and statistically significant determinant factor in both models 8 and 10. External debt stocks to GNI had a positive and statistically significant impact on credit default swaps in both models. FDI to GDP was found to have a statistically significant and positive effect on credit default swaps in both models.

Official reserves to GDP were found to have a negative and statistically significant effect on credit default swaps in both models 8 and 10. General government debt to GDP had a negative impact on estimating credit default spread in model 8 and a negative, statistically significant impact on estimating credit default spread in model 10. Current Account Balance to Cars (%) was found to be a negative and statistically significant determinant factor of credit default swaps for both models 8 and 10.

The FDI to GDP ratio has the highest marginal contribution to sovereign default among the analyzed domestic indicators and the group of exchange rate factors,

domestic factors, and international factors. Conversely, GDP per capita growth (%) has the least marginal contribution among the analyzed groups and reaches its lowest value when analyzed within the exchange rate factors and domestic factors group.

Based on the estimation results, EMEs differ from the all-countries set in terms of restricted data significance, particularly exchange rate factors. Official exchange rate and exchange rate volatility are significant determinant factors of exchange rate factors in both single and combined analysis with domestic and international factors. Inflation, claims on private sector, external debt stocks to GNI, FDI to GDP, official reserves to GDP, and current account to CARS are significant determinant factors of credit default swap of domestic factors for analysis done with domestic factors and the analysis with exchange rate factors and international factors added. VIX is a significant determinant of credit default swap spread for single analysis and the analysis made with exchange rate factors and domestic factors added to single analysis.

The obtained results are similar to the research of Gadanecz et al. (2014) in terms of marginal contributions and the sign of the indicators analyzed in this study.

Table 13. Fixed Effect panel model of Credit Default Spread in Emerging Countries.

Fixed Effect panel model of Credit Default Spread in Emerging Countries January 1995-2021					
Model Number	***6***	***7***	***8***	***9***	***10***
Exchange Rate Factors					
Official Exchange Rate (LCU per US Dollar) from 1985	-0.0062* (0.00036)	-	-	-0.00066** (0.00026)	-0.00061** (0.00023)
Exchange Rate Volatility (LCU per US Dollar)	0.00275** (0.00128)	-	-	0.00174 (0.00111)	0.00161* (0.00097)
Domestic Factor					
GDP per capita growth (annual %)	-	-	-0.00379 (0.01147)	-0.00402 (0.01134)	0.02481** (0.01052)
Inflation, consumer prices (annual%)	-	-	0.03821*** (0.00598)	0.03672*** (0.00595)	0.03108*** (0.00538)
Claims on private sector (annual growth as% of broad money)	-	-	-0.01405** (0.00465)	-0.0133** (0.00462)	-0.0168*** (0.00443)
External Debt Stocks to GNI	-	-	1.76091*** (0.2899)	1.86089*** (0.2934)	2.16897*** (0.26621)
FDI to GDP	-	-	8.33605*** (1.53435)	8.17448*** (1.51942)	8.85475*** (1.37647)

Table 13. continued

Official reserves to GDP	-	-	-3.6113*** (0.60311)	-3.38872*** (0.60434)	-3.32293*** (0.53833)
General Government Debt to GDP	-	-	-0.02326 (0.01548)	-0.02326 (0.01537)	-0.589* (0.01363)
Current Account Balance to Cars (%)	-	-	-2.86351** (1.17381)	-2.73431** (1.16287)	-2.5196** (1.05078)
International Factor					
World Governance Indicators	-	-0.00026 (0.0001)	-	-	-0.00075 (0.00064)
V_vix	-	0.04387*** (0.00452)	-	-	0.0291*** (0.00385)
Constant	4.974***	3.9374***	5.21157***	5.19501***	4.46327***
Number of observations	569	570	221	221	212
Adjusted R2	0.04639	0.10166	0.48307	0.49484	0.60804
F Value	0.000	0.000	0.000	0.000	0.000
Akaike Information Criteria	1489.639 (627)	1378.58 (626)	719.2708 (405)	721.1685 (405)	621.5167 (386)
Bayesian Information criteria	1502.962 (627)	1391.898 (626)	751.3019 (405)	761.2074 (405)	668.9868 (386)
Hausman Test with Random Effect	0.6523	0.7687	0.5762	0.8298	0.0490

Source: Authors calculation

3.3. Robustness: Significance of Exchange Rate Factors

We have taken measures to ensure the reliability of our findings regarding the impact of exchange rate factors on all countries' and EMEs' credit default swaps. We achieved this by conducting estimations of our benchmark model in various ways.

Firstly, we utilized a GMM regression to address reverse causality issues that may arise between credit default yields and the exchange rate. Secondly, we analyzed different sub-periods to determine the significance of exchange rate factors in driving credit default swaps. It is possible that the influence of exchange rate factors on credit default swaps may have changed over time.

Lastly, we analyzed various cases of all countries and EMEs grouped based on the degree of capital account openness and exchange rate regimes in the last section.

3.3.1. Potential reverse causality

In this analysis, we are examining a potential issue known as reverse causality, which can lead to endogeneity. This occurs when the causality link being

investigated runs in both directions, resulting in biased estimates. Lesczensky et al. (2022) propose a solution to this problem in the form of a cross-lagged panel model with fixed effects. This model not only protects against bias resulting from reverse causality under a wide range of conditions, but also helps to address the issue of temporal lags that are mis-specified.

In our analysis, we found that the relationship between credit default swaps and exchange rate factors can have a causal effect in both directions. One perspective is that movements and volatility in exchange rates can impact credit default swaps. Alternatively, some argue that the causality runs from credit default swap spreads to the exchange rate, as seen in the study by Liu et al. (2012).

Table 14 contains the results of different models used to estimate credit default spreads for a period of 5 years. The models include panel fixed effects, panel system GMM, and SGMM with 1 and 2 lags. Model 11 presents the fixed effect panel model's estimation results for exchange rate factors, domestic factors, and international factors for all countries. Model 12 shows the results of the 1 lag SGMM for the same factors and countries. Model 13 reports the results of the 2 lag SGMM for the same factors and countries. Model 14 presents the fixed effect panel model's estimation results for exchange rate factors, domestic factors, and international factors for EME countries. Model 15 shows the results of the 1 lag SGMM for the same factors and EME countries. Model 16 reports the results of the 2 lag SGMM for the same factors and EME countries.

We depend on the panel dynamic GMM methodology (or system GMM) to obtain unbiased estimates of our benchmark model (models 11 and 14) to check robustness. This methodology was introduced by Arellano and Bond (1991) and further developed by Blundell and Bond (1998). In order to eliminate the computational requirements of the GMM estimation, the benchmark model was estimated without rating dummies, using both panel fixed effect (standard error) and GMM approaches.

Based on Roodman's study in 2009, the System GMM estimation results meet the Autocorrelation (1) and (2) conditions, as well as the Sargan test. However, the

significance of the exchange rate factors is affected. It is observed that the panel system GMM results differ from those obtained by implementing a panel fixed effect approach.

The estimation results indicate that we cannot generally reject the null hypothesis of no autocorrelation. The Hansen test does not reject the null hypothesis of no over-identification. The Sargan test rejecting the hypothesis may be because the Hansen test is more resilient than the Sargan test. For example, the Sargan test is distributed as chi-squared under heteroskedasticity, whereas the Hansen test is not. Another explanation could be that the number of instruments in our model is significant.

These results are consistent for all countries and EME when we change the number of lags from 1 to 2 in GMM estimations.

For all-countries analysis, exchange rate factors keep their sign the same in the analysis, but the marginal impacts change. The exchange rate factors' marginal contribution in the fixed effect panel data analysis is higher than they are analyzed in both 1 lag and 2 lag models. Also, exchange rate volatility has the same sign in each analyzed group, and its highest effect is obtained in the analysis of fixed effect panel data analysis.

When the domestic factors are analyzed it is seen that, GDP per capita has the same sign in analyzed all models, positive, but it has its highest marginal contribution in the analysis of the 1 lag SGMM model. Inflation has a positive impact in all types of analysis, and it has the greatest marginal impact in fixed effect panel data analysis. Claims on the private sector’s sign of contribution show variation among the fixed effect model and SGMM models.

The fixed effect model shows that indicators have the greatest impact on credit default spread. External debt stocks to GNI has a positive sign in all models, and it is found that in the SGMM model with a lag of 1, external debt stocks to GNI reaches its highest value.

FDI to GDP Ratio's marginal impact is the highest among all other indicators, in each analyzed model. Its sign is the same for all analyzed models, positive. Official reserves to GDP's marginal contribution have the second highest marginal contribution on credit default swaps. The sign of the indicator is similar, negative in each analyzed model. General Government Debt to GDP has the same sign, negative in each analyzed model and the indicator makes the highest contribution in 1 lag SGMM model. The contribution of Current Account Balance to Cars (%) is both positive and negative in the models. The variable's highest marginal impact in the 2 lag SGMM model.

The international factors are analyzed by two indicators and World Governance Indicators make a negative effect in each model and it reaches its highest marginal contribution in the 2 lag SGMM model. VIX contributes positively in each analyzed model and the indicator reaches its highest level in the 1 lag SGMM model.

Our analysis of all countries, with exchange rate factors SGMM part, is consistent with the results of Gadanecz et al. (2014) in terms of the impact of exchange rates. The impact of exchange rates is negative, while exchange rate volatility has a positive impact on credit default spread. The analysis results show that domestic indicators, especially GDP per capita growth, have a similar effect in terms of the sign of the contribution in all three analyzed models, as Gadanecz et al (2014). Considering the analysis of international factors of fixed effect panel data and 1 lag SGMM model's output, particularly VIX has significantly affected credit default swap.

In the analysis for EME Countries, exchange rate factors impact takes both positive and negative values among the models and the indicator reaches its supreme value in 1 SGMM model. Similarly, exchange rate volatility marginal value has both positive and negative effects. Then, the indicator reaches its highest level in the 1 lag SGMM model.

When the domestic factors are analyzed it is seen that, GDP per capita has the same sign in all analyzed models, positive, but it has its highest marginal contribution in

the analysis of 1 lag SGMM model. Inflation has a positive impact in all types of analysis and it has the greatest marginal impact in the 1 lag SGMM model. Claims on the private sector's signs of contribution are always negative in analyzed models.

The SGMM model with a 1 lag shows that the indicators have the highest effect on the credit default spread.In the case of external debt stocks to GNI sign is the same for all the models, positive and it is obtained that, in the model of 1 lag SGMM model external debt stocks to GNI reaches its highest value. FDI to GDP Ratio's marginal impact constitutes the highest value among all other indicators, in each analyzed model. Its sign is the same for all analyzed models, positive. It reaches its highest value in the 1 lag SGMM model.

Official reserves to GDP's impact on credit default spread are both positive and negative. The indicator has the highest marginal value in the 2-lag SGMM model. General Government Debt to GDP has the same sign, negative in each analyzed model and the indicator makes the highest contribution in 1 lag SGMM model. Current Account Balance to Cars (%) contribution is negative in all models and marginal contribution has the second highest marginal contribution on credit default swaps. The variable's highest marginal impact is in the 1 lag SGMM model.

The international factors are analyzed by two indicators and World Governance Indicators make a negative effect in each model and it reaches its highest marginal contribution in the 1 lag SGMM model. VIX contributes positively in each analyzed model and the indicator reaches its highest level in fixed effect panel data analysis.

The results of our analysis on the exchange rate factors for EMEs countries are in line with the findings of Gadanecz et al. (2014) regarding the impact of exchange rate and exchange rate volatility on credit default swaps. Our analysis reveals that domestic indicators, especially the growth of GDP per capita, have a similar effect on the contribution sign across all three models, as discovered by Gadanecz et al. (2014). When analyzing fixed effect panel data and using a 1-lag SGMM model, we found that the VIX, in particular, has an impact on credit default swaps.

Table 14. Panel Fixed Effects and Panel System GMM models.

Panel Fixed Effects and Panel System GMM models of credit default spread 5 year						
Model Number	*11*	*12*	*13*	*14*	*15*	*16*
Exchange Rate Countries	*ALL Countries*	*ALL Countries*	*ALL Countries*	*EME Countries*	*EME Countries*	*EME*
Factors	*FE*	*SGMM 1 lag*	*SGMM 2 lag*	*FE*	*SGMM1 lag*	*SGMM 2 lag*
Official Exchange Rate (LCU per US Dollar) from 1985	-0.0006*** (0.00024)	-0.00019 (0.00019)	-0.00017 (0.00018)	-0.00061** (0.00023)	0.00121 (0.00099)	0.00006 (0.00076)
Exchange Rate Volatility (LCU per US Dollar)	0.00135 (0.00098)	0.00054 (0.00089)	0.00048 (0.00087)	0.00161* (0.00097)	-0.00332 (0.00294)	-0.00031 (0.00222)
Domestic Factor						
GDP per capita growth (annual %)	0.01452 (0.01015)	0.08409* (0.04406)	0.06947 (0.05191)	0.02481** (0.01052)	0.13361** (0.05861)	0.06297 (0.04556)
Inflation, consumer prices (annual%)	0.0262*** (0.00518)	0.01197 (0.01698)	0.01603 (0.01725)	0.03108*** (0.00538)	3.12502 (0.0755)	0.03644 (0.05845)
Claims on private sector (annual growth as% of broad money)	-0.01214** (0.00391)	0.00268 (0.01502)	-0.00346 (0.01834)	-0.0168*** (0.00443)	-0.07805 (0.05228)	-0.02893 (0.0439)
External Debt Stocks to GNI	1.81103*** (0.25557)	2.24753** (0.88222)	1.9516* (1.03117)	2.16897*** (0.26621)	9.36839** (3.77708)	4.1986 (3.42808)
FDI to GDP	7.49494*** (1.27739)	10.05841 (6.08239)	11.93126* (6.32729)	8.85475*** (1.37647)	45.4859** (19.74583)	28.01618** (10.42553)
Official reserves to GDP	-3.74763*** (0.5372)	-4.86153** (2.04548)	-4.59217** (1.91454)	-3.32293*** (0.53833)	1.43553 (5.73631)	-6.04934 (4.99498)
General Government Debt to GDP	-0.01659 (0.01253)	-0.07435* (0.03872)	-0.05985 (0.04722)	-0.02589* (0.01363)	-0.08325 (0.04945)	-0.00545 (0.05287)
Current Account Balance to Cars (%)	-1.33241 (0.93811)	0.04036 (6.38764)	-2.14851 (6.88922)	-2.5196** (1.05078)	-50.1926 (32.17402)	-13.46181 (23.93033)
International Factor						
World Governance Indicators	-0.00072 (0.00066)	-0.00164 (0.00104)	-0.00206* (0.00114)	-0.00075 (0.00064)	-0.00964** (0.00432)	-0.00507 (0.00291)
V_vix	0.02693*** (0.00364)	0.05635** (0.02133)	0.04558 (0.02898)	0.0291*** (0.00385)	0.00897 (0.04388)	0.02845 (0.04301)
Constant	4.74662***	3.80359**	4.25233**	4.46327***	0.72503	4.63677*
Number of observations	254	254	254	212	212	212
F test(p value)	0.000	0.000	0.000	0.000	0.000	0.000
First Order Autocorrelation		0.025	0.054		0.328	0.164
Second Order Autocorrelation		0.101	0.367		0.627	0.792
Sargan Test		0	0		0	0
Hansen Test		1	1		1	1

Source: Authors calculation

3.3.2. Capital Account Openness

The impact of exchange rate factors on credit default swaps can vary based on the level of capital account openness. When there are cross-border capital flows, there may be more official exchange rate fluctuations and uncertainty, particularly when capital account openness is higher. Our baseline model includes FDI-to-GDP ratio controls, which are likely to capture some of this effect. The type of exchange rate regime could influence how much exchange rate factors affect credit default swaps in all countries and emerging market economies (EMEs). We have categorized all 64 countries and 30 EMEs based on the Chinn-Ito index of capital account openness.

According to Lorca (2021), capital account openness affects the factors that determine sovereign default. In the case of portfolio capital flows, when considering emerging markets and measuring the impact of interest rates, risk aversion, and commodity price fluctuations, about a third of aggregate activity across the study's country sample can be explained by variations in capital flows.

On the other hand, Eichengreen et al. (1998) suggest that capital account liberalization can have two different effects. The first mechanism is through which internal and external financial stability are largely the same, while the second mechanism is not the financial liberalization that is at the root of the problem. Rather, it is the inadequacy of prudential supervision and regulation, whose consequences are simply magnified by liberalization.

Reinhart et al. (2016) analyzed the relationship between capital flows and sovereign default. They suggest that economic crises have long been connected to capital flows and commodity cycles. The study argues that there is a strong overlap between the debt and flow of financial capital, the commodity capital, the commodity price super-cycle, and sovereign defaults since 1815. The authors also suggest that many emerging markets face a double burst of capital inflows and commodity prices, which makes them vulnerable to crises.

Table 15 reports the estimation results for panel fixed effects and with the analysis of the impact of high capital openness and low capital openness models of credit default

spreads 5 years for All countries and EME countries. Model number 17 presents the fixed effect panel model estimation results that report the case of the exchange rate factors, domestic factors, and international factors for all countries. The following model 18 states panel fixed effects for the case of the exchange rate factors, domestic factors, and international factors for all countries in the case of high capital openness.

The following is a summary of the results obtained from various panel fixed effects models. Model 19 reports the estimation results for all countries in the case of low capital openness, while model 20 reports the estimation results for EME countries. Model 21 shows the estimation results for EME countries in the case of high capital openness, and model 22 states the estimation results for EME countries in the case of low capital openness.

According to Table 15, the official exchange rate is a significant determinant of credit default swaps for all countries, regardless of capital account openness. However, exchange rate risk, as measured by exchange rate volatility, is only a significant determinant of credit default swaps in conditions of high capital account openness.

For the analysis of all countries, exchange rate factors retain their negative sign, but the marginal impacts differ between high capital openness countries and low capital openness countries.

The exchange rate factors' marginal contribution in the high capital openness country analysis is higher than they are for both all-countries and low capital country openness countries model. Also, exchange rate volatility has the same sign in all countries and low capital openness countries set, positive and the impact of the indicators turns to negative for high capital openness countries. The exchange rate volatility reaches its highest effect obtained in the analysis of high capital openness country data analysis.

When the domestic factors are analyzed it is seen that GDP per capita has the same sign in all analyzed models, positive, but it has its highest marginal contribution in the all-countries group.

For the analysis of all countries, exchange rate factors retain their negative sign, but the marginal impacts differ between high capital openness countries and low capital openness countries.

In the case of external debt stocks to GNI sign is the same for all the models, being significantly positive and it is obtained that, in the model of high capital openness country set model external debt stocks to GNI indicator reaches its highest value. FDI to GDP Ratio makes the greatest marginal impact among all other indicators, in each analyzed country group. Its sign is the same for all analyzed models, significantly positive and it reaches its peak level for the high capital openness country set. Official reserves to GDP's marginal contribution has the second highest marginal contribution on credit default swaps. The sign of the indicator is negative in each analyzed model. The indicator reaches its maximum level for the high capital openness country data set. General Government Debt to GDP has different signs in each analyzed model.

In the high and low capital openness country groups, the indicator has a positive sign, whereas it has a negative sign for the all-countries group. The highest level of the indicator is observed in the high capital openness country group. The contribution of Current Account Balance to Cars (%) is negative in all the models. The highest marginal impact of the variable is observed in the high capital openness country group model.

The international factors are analyzed by two indicators and World Governance Indicators have a negative effect in each analyzed country group and it reaches its highest marginal contribution in the high capital openness country group. VIX contributes significantly positively in each analyzed model and the indicator reaches its highest level for the high capital openness country groups.

According to estimation results for the all-countries data set, capital openness increases the marginal effect for exchange rate factor groups on credit default spread. And then, for domestic factor groups, high capital openness raises the marginal impact of domestic factors on credit default spread. Also, for international factor

groups, the indicators' highest marginal effect on credit default spread is obtained in the highest level in the high capital openness country set. According to our estimation results, it is obtained that capital openness is a significant determinant in improving credit default spreads. The results are coherent with the contribution of Ogrokhina et al. (2019), who claim openness is significantly essential for developing sovereign ratings.

When the analysis results are investigated for the EMEs country group, the estimation results are interpreted as follows:

For the EMEs country analysis, exchange rate factors keep their sign at the same in the analysis, negative but the marginal impacts changes among EMEs country, High capital openness EMEs countries, and EMEs low capital openness countries. The exchange rate marginal contribution in the high capital openness EMEs country analysis is higher than they are analyzed in both all and low capital country openness countries model. Also, exchange rate volatility has the same sign in EMEs country set and low capital openness country set positive, but the indicator's sign is negative for high capital openness EMEs. The Exchange rate volatility reaches its highest effect obtained in the analysis of high capital openness EMEs country data analysis.

When the domestic factors are analyzed, it is seen that GDP per capita has the same sign in analyzed all models, positive, and it has its highest marginal contribution in the EMEs country group. Inflation has a significantly positive impact on all types of EMEs country set and it has the greatest marginal impact in high capital openness country analysis. Claims on the private sector’s sign of contribution show a similar impact as it is significantly negative for each EMEs group. "The indicator has the strongest impact on the credit default spread within the EMEs group."

In the case of, external debt stocks to GNI sign is the same for all the models, significantly positive for each EMEs country group and it is obtained that, in the model of low capital openness country set model external debt stocks to GNI reach its highest value. The FDI to GDP Ratio makes the greatest marginal impact among all other indicators, in each analyzed EMEs country group. Its sign is the same for all

analyzed models, significantly positive and it reaches its highest level for the high capital openness country set. The marginal contribution of Official reserves to GDP is the second-highest marginal contribution on credit default swaps. The sign of the indicator is similar, significantly negative in each analyzed model. The indicator reaches its maximum level for the high capital openness EMEs country data set.

General Government Debt to GDP has different signs in each analyzed model. For EMEs and low Capital Openness Country groups, the indicator's sign is negative, and for high country group, the indicator's sign is positive. The indicator reaches its highest level for the low capital openness EMEs country group.

The contribution of Current Account Balance to Cars (%) is negative in each model. The variable's impact is the highest marginal for the high capital openness country group model.

The international factors are analyzed by two indicators and World Governance Indicators make a negative effect in each analyzed country group and it reaches its highest marginal contribution in the high capital openness country group. VIX contributes significantly positively in each analyzed model and the indicator reaches its highest level for the high capital openness country groups.

According to estimation results for the EMEs country data set, capital openness increases the marginal effect of exchange rate factor groups on credit default spread. For domestic factor groups, high capital openness raises the marginal impact of domestic factors on credit default spread. Also, for international factor groups, the indicators' highest marginal effect on credit default spread is obtained in the highest level in the high capital openness country set. According to our estimation results, it is obtained that capital openness is a significant determinant in improving credit default spreads. The results are coherent with the contribution of Ogrokhina et al. (2019), who claim openness is significantly essential for developing sovereign ratings.

For EME countries, official exchange rates and exchange rate risks are significant determinants of credit default swaps only when capital account openness is low.

Table 15. Fixed Effect panel model of Credit Default Spread in All and EME Countries.

Fixed Effect panel model of Credit Default Spread in All and EME Countries *Estimates by capital openness*						
Model Number	*17*	*18*	*19*	*20*	*21*	*22*
Exchange Rate Factors	*ALLCountries FE*	*ALL High KA Openness*	*ALL Low KA Openness*	*EME Countries FE*	*EME High KA Openness*	*EME Low KA Openness*
Official Exchange Rate (LCU per US Dollar) from 1985	-0.0006*** (0.00024)	-0.03096** (0.01327)	-0.0007** (0.00026)	-0.00061** (0.00023)	-0.06069 (0.03835)	-0.00076** (0.00025)
Exchange Rate Volatility (LCU per US Dollar)	0.00135 (0.00098)	-0.08236** (0.04059)	0.00157 (0.00104)	0.00161* (0.00097)	-0.09188 (0.012633)	0.00192* (0.00101)
Domestic Factor						
GDP per capita growth (annual %)	0.01452 (0.01015)	0.00593 (0.01751)	0.00853 (0.0135)	0.02481** (0.01052)	0.02353 (0.01954)	0.02025 (0.01321)
Inflation, consumer prices (annual%)	0.0262*** (0.00518)	0.03602** (0.01598)	0.02088** (0.00684)	0.03108*** (0.00538)	0.03861* (0.01979)	0.02631*** (0.00668)
Claims on private sector (annual growth as% of broad money)	-0.01214** (0.00391)	-0.02096** (0.00737)	0.00919* (0.00522)	-0.0168*** (0.00443)	-0.01678** (0.00797)	-0.01399** (0.00594)
External Debt Stocks to GNI	1.81103*** (0.25557)	1.89276*** (0.38101)	1.78204*** (0.36564)	2.16897*** (0.26621)	2.09789*** (0.4148)	2.27471*** (0.37177)
FDI to GDP	7.49494*** (1.27739)	7.89316*** (1.69431)	5.44624** (2.38698)	8.85475*** (1.37647)	10.17557*** (2.0846)	6.42693** (2.92526)
Official reserves to GDP	- 3.74763*** (0.5372)	- 4.67953*** (0.8302)	- 2.69152*** (0.80882)	- 3.32293*** (0.53833)	-4.11121*** (0.91667)	-2.13086** (0.82312)
General Government Debt to GDP	-0.01659 (0.01253)	0.02432 (0.02387)	0.02 (0.01618)	-0.02589* (0.01363)	0.02534 (0.02872)	-0.03124* (0.01739)
Current Account Balance to Cars (%)	-1.33241 (0.93811)	-2.08533 (1.39707)	-0.30445 (1.82686)	-2.5196** (1.05078)	-3.01463 (1.86027)	-1.64583 (1.76079)
International Factor						
World Governance Indicators	-0.00072 (0.00066)	-0.04525* (0.02286)	-0.00074 (0.00071)	-0.00075 (0.00064)	-0.07393** (0.03553)	-0.00074 (0.00067)
V_vix	0.02693*** (0.00364)	0.02881*** (0.00494)	0.02668*** (0.00529)	0.0291*** (0.00385)	0.03162*** (0.00581)	0.02827*** (0.00515)
Constant	4.74662***	6.55369***	4.50938***	4.46327***	6.88211***	4.22098***
Number of observations	254	96	146	212	66	134
Adjusted R2	0.53053	0.70459	0.45788	0.60804	0.79378	0.54114
F Value	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors calculation

3.3.3. Exchange Rate Regime

The impact of exchange rate factors on credit default swaps may vary depending on the exchange rate regime. Additionally, capital flows can lead to fluctuations in both

exchange rates and their unpredictability. The type of exchange rate regime can affect the extent to which exchange rate factors are transmitted to credit default swaps in all countries and emerging market economies (EMEs). Furthermore, all 64 countries and 30 EMEs are categorized based on the International Monetary Fund's classification of de facto exchange rate regimes.

The likelihood of a country going into default is influenced by a number of external factors, particularly the type of exchange rate system in use. According to a study by Domac et al. (2000), fixed exchange rate regimes can help to decrease the risk of a banking crisis, especially in developing countries, after taking into account various economic, financial, and external factors. Domac et al. (2000) suggest that the cost of a crisis tends to be higher in countries with more inflexible exchange rate systems due to (i) lending-based consumption booms, which are more common under fixed exchange rate systems and can lead to a sharp contraction in economic activity when they disappear, and (ii) the difficulty of providing necessary liquidity to the banking system in the absence of close bank loan substitutes under the prevailing exchange rate system.

According to the results presented in Table 16, in the case of countries with flexible exchange rate regimes, the official exchange rate is a significant determinant of credit default swaps. In addition, exchange rate volatility is also an important factor that affects credit default swaps in this type of regime. For emerging market economies with flexible exchange rate regimes, the official exchange rate is a significant determinant of credit default swaps.

Table 16 reports the estimation results for panel fixed effects and with the analysis of the impact of high capital openness and low capital openness models of credit default spreads 5 years for All countries and EME countries. Model number 23 presents the fixed effect panel model estimation results that report the case of the exchange rate factors, domestic factors, and international factors for all countries. The following model 24 states panel fixed effects for the case of the exchange rate factors, domestic factors, and international factors for all countries in the case of flexible ERR.

The following four models contain the results of panel fixed effects for different scenarios. Model 25 displays the results for all countries in the case of a rigid

exchange rate regime. It reports the exchange rate factors, domestic factors, and international factors. Model 26 provides the same information but only for emerging market economies (EME). Model 27 focuses on EME countries with a flexible exchange rate regime, while model 28 covers EME countries with a rigid exchange rate regime. All models include the estimation results for the exchange rate factors, domestic factors, and international factors.

In the analysis of all countries, the exchange rate factors remain negative but the marginal impacts differ among the countries with flexible exchange rate regime and those with rigid exchange rate regime. The marginal contribution of exchange rate factors is higher in the countries with rigid exchange rate regime than in the other two groups. Moreover, the impact of exchange rate volatility varies among the three groups. In the countries with rigid exchange rate regime, the impact is negative, while it is positive for the all-countries dataset and flexible exchange rate regime countries. The maximum level of exchange rate volatility's impact is observed significantly in the flexible exchange rate regime countries.

When the domestic factors are analyzed it is seen that GDP per capita has the same sign in all analyzed models, positive. The indicator’s marginal contribution reaches its highest level in the flexible exchange rate regime country data. Inflation has a positive impact on all types of analysis, and it has the greatest marginal impact significantly positive for the analysis of rigid exchange rate regimes. The sign for the contribution of claims on the private sector is negative for all countries, flexible and rigid exchange rate regimes. The indicator's marginal contribution is estimated to be the highest in the flexible exchange rate regime all-countries set, the lowest value is in the estimation of rigid exchange rate regime EMEs country set. In the case of, external debt stocks to GNI sign is the same for all the models, significantly positive and it is obtained that the highest marginal value is calculated for the flexible exchange rate regime and the lowest value is obtained in all countries set for the rigid exchange rate regime.

FDI to GDP Ratio makes the greatest marginal impact among all other indicators, in each analyzed country group. Its sign is the same for all analyzed models,

significantly positive and it reaches its highest level for flexible exchange rate regime countries. Similar to the prior analysis, Official reserves to GDP indicator's marginal contribution has the second highest marginal contribution on credit default swaps. The sign of the indicator is similar, negative in each analyzed model. The indicator reaches its maximum level for the rigid exchange rate regime data set. General Government Debt to GDP has negative effects for each analyzed country group. It is reported that the indicator's calculated highest marginal impact is in the rigid exchange rate regime country set. The current Account Balance to Cars (%) contribution is negative in each model. It is estimated that the variable's marginal value reaches the peak for a flexible exchange rate regime.

The international factors are analyzed by two indicators and World Governance Indicators make both positive and negative impacts in each analyzed country group. It is estimated that the indicator's greatest marginal contribution is obtained in the rigid exchange rate country group.

The VIX indicator has a positive impact in all analyzed groups, with the highest value observed in flexible exchange rate regimes and the lowest in rigid exchange rate regimes.

For the all-countries dataset, a flexible exchange rate regime increases the effect of exchange rate factors on credit default spread. It also raises the impact of domestic factors on credit default spread for domestic factor groups. Furthermore, it improves the contribution of each indicator group for international factor groups. These results suggest that the exchange rate regime is an important factor in improving credit default spreads. This is consistent with the findings of Gadanecz et al. (2014), who claim that the exchange rate regime is a significant determinant in developing sovereign ratings for all countries.

In analyzing the emerging market economies (EMEs), it has been observed that the impact of exchange rate factors varies among countries with flexible and rigid exchange rate regimes. The variable has the highest positive effect on countries with rigid exchange rate regimes, while the EMEs country group has the lowest marginal

contribution. Additionally, the impact of exchange rate volatility is both positive and negative depending on the country group. The indicator reaches its maximum marginal impact in rigid exchange rate regimes and drops to the lowest marginal effect for the EMEs country group.

When the domestic factors are analyzed it is seen that GDP per capita contributes positively in Rigid Exchange Rate Regime EMEs country and negatively in EMEs country and flexible Exchange rate regime EMEs countries.

The EMEs country groups show the highest marginal contribution, whereas the flexible exchange rate regime displays the lowest marginal contribution.

Inflation has a significant positive impact on credit default swaps for Emerging Market Economies (EMEs). Within the rigid exchange rate regime, inflation has the greatest marginal contribution, while within the flexible exchange rate regime, inflation contributes the lowest marginal impact. The contribution of Claims on the private sector shows a similar impact, being significantly negative for each group of EMEs. The highest marginal effect of the indicator is observed on credit default spread in the EMEs group, while the lowest marginal effect is observed in the rigid exchange rate regime.

For external debt stocks to Gross National Income (GNI), the sign is the same for all models and is significantly positive for each group of EMEs. The highest contribution of this indicator is estimated in the analysis of EMEs countries, while the lowest value is calculated in the rigid exchange rate regime countries.

FDI to GDP Ratio has the greatest marginal impact among all other indicators in each analyzed EMEs country group. The contribution of this indicator is significantly positive for all models and it reaches its highest level for EMEs country group and the lowest for the rigid exchange rate regime country group.

The second highest marginal contribution on credit default swaps is made by Official Reserves to GDP's indicator. The sign of the indicator is similar, being significantly

negative in each analyzed model. The indicator reaches its greatest marginal contribution in the analysis of rigid exchange rate regime country group and its lowest impact is observed in flexible exchange rate regimes. The impact of General Government Debt to GDP is negative in each analyzed model, reaching its highest level for flexible exchange rate regimes and the lowest marginal impact in the rigid exchange rate regime. The analysis indicates that the contribution of Current Account Balance to Cars (%) is negative in each model. The highest marginal effect of this variable is observed in flexible exchange rate regimes, while the lowest marginal effect is seen in the rigid exchange rate regime.

The international factors are evaluated using two indicators, and World Governance Indicators have both positive and negative effects in each analyzed country group. The indicator attains its highest marginal contribution in the rigid exchange rate regime and the lowest value in the flexible exchange rate regime. VIX contributes significantly positively in each analyzed group, with the highest level in the case of EMEs country group, and the lowest contribution in a flexible exchange rate regime.

The estimation results for EMEs country data set reveal that a flexible exchange rate regime enhances the exchange rate factor group's marginal effect on credit default spread. For domestic factor groups, a flexible exchange rate regime increases the marginal impact of domestic factors on credit default spread. The results indicate that a flexible exchange rate regime is a significant determinant in improving credit default spreads. These findings are consistent with the report of Gadanecz et al. (2014), which asserts that the exchange rate regime plays a critical role in developing sovereign ratings.

Table 16. Fixed Effect panel model of Credit Default Spread in All and EME Countries.

Fixed Effect panel model of Credit Default Spread in All and EME Countries Estimates by ERR						
Model Number	*23*	*24*	*25*	*26*	*27*	*28*
Exchange Rate Factors	*ALLCountries FE*	*ALL ERR Flexible*	*ALL ERR Rigid*	*EME Countries FE*	*EME ERR Flexible*	*EME ERR Rigid*
Official Exchange Rate (LCU per US Dollar) from 1985	-0.0006*** (0.00024)	-0.00066** (0.00024)	-0.00452 (0.00396)	-0.00061** (0.00023)	-0.00079** (0.00027)	0.00868 (0.01149)

Table 16. continued

Exchange Rate Volatility (LCU per US Dollar)	0.00135 (0.00098)	0.0016* (0.00102)	-0.00136 (0.01080)	0.00161* (0.00097)	0.00179 (0.00112)	-0.02703 (0.02885)
Domestic Factor						
GDP per capita growth (annual %)	0.01452 (0.01015)	0.02704** (0.01333)	0.012536 (0.01509)	0.02481** (0.01052)	0.00178 (0.02226)	-0.00885 (0.26021)
Inflation, consumer prices (annual%)	0.0262*** (0.00518)	0.03167*** (0.00619)	0.04273* (0.01708)	0.03108*** (0.00538)	0.02840*** (0.00772)	0.05799** (0.02020)
Claims on private sector (annual growth as% of broad 118oney)	-0.01214** (0.00391)	-0.02053** (0.00646)	-0.01167** (0.00553)	-0.0168*** (0.00443)	-0.01658* (0.00911)	-0,00732 (0.0075)
External Debt Stocks to GNI	1.81103*** (0.25557)	2.28675*** (0.33909)	1.45674*** (0.38346)	2.16897*** (0.26621)	2.04243*** (0.59862)	1.95316*** (0.51751)
FDI to GDP	7.49494*** (1.27739)	8.30993*** (2.09734)	6.96527*** (1.86020)	8.85475*** (1.37647)	8.8508** (2.73082)	8.05105** (2.81022)
Official reserves to GDP	-3.74763*** (0.5372)	-2.94550*** (0.70148)	-3.96525*** (0.83919)	-3.32293*** (0.53833)	-1.72837* (0.95317)	-4.13721*** (0.96401)
General Government Debt to GDP	-0.01659 (0.01253)	-0.01898 (0.18845)	-0.04746** (0.017480)	-0.02589* (0.01363)	-0.04048* (0.23572)	-0.0327 (0.03117)
Current Account Balance to Cars (%)	-1.33241 (0.93811)	-2.80533* (1.48768)	-0.72375 (1.41515)	-2.5196** (1.05078)	-3.22879 (2.04165)	-0.50362 (2.55001)
International Factor						
World Governance Indicators	-0.00072 (0.00066)	-0.00082 (0.00068)	0.00166 (0.00476)	-0.00075 (0.00064)	-0.00065 (0.00074)	0.00399 (0.00496)
V_vix	0.02693*** (0.00364)	0.02754*** (0.0047)	0.02498*** (0.00563)	0.0291*** (0.00385)	0.02057** (0.00707)	0.02862*** (0.0069)
Constant	4.74662***	4.54046***	4.81241***	4.46327***	4.54614***	4.23237***
Number of observations	254	158	96	212	88	56
Adjusted R2	0.53053	0.53475	0.61637	0.60804	0.47684	0.75226
F Value	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors calculation

3.4. Conclusion

Analyzing the sovereign default risk in all types of countries is essential for global investors and central banks. Recent EME exchange rate movements have strongly affected all countries through domestic and international factors. This research has attempted to fill the gap in the literature by explicitly accounting for exchange rate factor-especially official exchange rates and uncertainty- in modeling credit default swaps in all types of countries and EMEs.

The impact of factors of exchange rate shows different behavior depending on the country set. For all types of countries, advanced countries, emerging countries, developing countries, financial and nonfinancial centers, the official exchange rate is a significant determinant of credit default swaps, when estimations are made including domestic and international determinant factors in the model. The empirical analysis suggests that for the EMEs' estimation results, both the official exchange rate and exchange rate risk (proxies by exchange rate volatility) are vital determinant factors for credit default swaps, when estimations are done both including and excluding domestic and international factors in the model.

Although domestic factors are significant for all-countries set, they are more significant for the case of EMEs in determining credit default swap. For instance, general government debt to GDP or current account balance to CARS (%) can weaken the currencies of these countries and increase uncertainties about exchange rate stability. International factors show differences in terms of the impact in different country set as: VIX is a significant determinant factor for both sets for the cases both in which its marginal impact is measured and also in the cases where its effect is measured including exchange rate factors and domestic factors in the analysis. An adverse shock in international markets can have a similar effect. As a result, investors demand more risk premium to compensate for higher expected default risk and more stability about the future path of exchange rates.

Our estimation results show that the relationship between exchange rate and credit default swap is sensitive to crisis, monetary changes. In addition to this, when the impact of capital openness on the credit default swap and exchange rate is analyzed, results show that while high capital openness increases the significance of exchange rate factors for all-countries set, on the other hand, the significance of exchange rate factors increases for low capital openness for EMEs. Through the robustness check, another analyzed factor is the exchange rate regime. Different from the analysis of capital openness, flexible exchange rate regime shows similar effect for both country sets by increasing the significance of exchange rate factors for all countries and EMEs.

Our findings are also in parallel with those in the literature regarding the relative importance of domestic and global drivers in cases of all-countries and EMEs considering determinant factors of credit default swaps spreads. Domestic factors, especially external debt stocks to GDI, official reserves to GDP, and FDI to GDP ratio, are critical determinants of credit default swaps for both all-countries and EMEs cases. However, the credit default swaps are also affected by global social and monetary conditions, after the financial crisis in 2008. In particular, the significant easing in monetary policy in advanced economies has prompted investors to search for credit default swaps.

CHAPTER 4

CONCLUSION

The crisis was defined by a vast of literature and analyzed under diverse names and types till the 2008-09 Global Financial Crisis. As Reinhart (2008) states, although the literature describes and analyzes the crises separately, they resemble each other in many circumstances. That means that while it is possible to analyze each crisis differently, they will show similar properties in the end. In this thesis, initially, we aim to analyze the different types of crises and the ratio of each type of crisis among all other crises.

To answer this question, we concentrate on Reinhart and the online data bank, that spans the years between 1800 and 2016. Assuming everything is similar around the world, the time interval is divided into nine subgroups that make it possible to analyze the following milestone events separately, that affect all around the world: the Industrial Revolution, the First World War, the great depression, the Second World War, first oil crisis, second oil crisis, the great recession. The crisis definition is taken from Reinhart et al. (2021) and the analysis covers the following crises: banking crisis, systematic crisis, currency crisis, inflation crisis, domestic debt in default, and sovereign external debt. Assuming all the other country-specific factors are similar, these crises are analyzed in six different country groups: all, financial, non-financial, advanced, emerging, and developing countries set. All these different crises are analyzed to measure the ratio of crisis years observed for each crisis.

The evidence presented in Chapter 2 reports that for all countries set except inflation crisis; banking crisis, systematic crisis, currency crisis, domestic debt in default and sovereign external debt crisis ratio of crisis years observed increased comparatively from the beginning to the end of analyzed period 2016. On the other hand, all types

of crises that are researched for emerging market economies increase comparatively from the beginning of the period to the end of the period. For the analyzed period, sovereign external debt is the most observed type of crisis among the researched groups depending on the all-period average for all countries and emerging market economies. Reinhart et al. (2008) claim that crises are different from each other, but they also have similarities. That motivated us to concentrate on the most frequent type of crisis. Sovereign external debt crisis. Reinhart et al. (2008) indicate financial crises are distinct and they also have similarities.

Chapter 2 also reports that, for all country groups and emerging market economies the sovereign external debt has the highest ratio of crises years observed for all the period between 1800 and 2016. Also, the relationship between credit default swaps and exchange rate values is analyzed for all countries, advanced countries, developing countries, emerging market economies, financial centers, and non-financial centers for the period between 1995 and 2020. For all county groups, both indicators move in opposite directions for each period for all analyzed country types. It is obtained that CDS and exchange rate move in opposite directions in analyzed periods. In the case of the exchange rate being investigated as a determinant indicator of sovereign default; it is observed that the exchange rate has a negative impact on determining credit default spread for advanced and financial centers, whereas it turns to the opposite for developing countries as the exchange rate has a positive effect on credit default spreads.

It is reported that sovereign external debt is the most observed type of crisis among the research groups depending on the whole period average for all countries, developing, emerging, and nonfinancial countries. On the other hand, for advanced countries currency crises are the most seen type of crisis, and for financial centers: banking crises are the most seen type of crisis. The probability of happening for any type of crisis presents a rising and falling path during the analyzed period. While the frequency of happening of each crisis presents differences among the country groups, the ratio of sovereign external debt crises is higher than other crisis types for more than half of the groups under analysis. It motivates us to concentrate on researching the sovereign external debt crisis.

The vast part of the literature researched sovereign external debt crisis by defining the crisis as a sovereign default and by considering the catastrophic effect of sovereign default, this research also aims to define and guess the probability of happening of the sovereign default. To succeed in this target, the literature has defined sovereign risk to guess sovereign default. Similar to the definition of the crisis, the IMF report (2010) states that there is no precise formula that measures sovereign risk; it is calculated utilizing credit ratings, government bond yield spreads, and credit default swaps.

At the beginning of the 1990s, Cantor et al. (1996) and Afonso et al. (2003) concentrated on three leading agencies to measure sovereign default risk; both researches reported that macroeconomic indicators affect sovereign default risk. Gadanecz et al. (2014) proxied sovereign default with local currency sovereign bond yield and this research reports that exchange rate factors affect sovereign default, in the case of default proxied by sovereign default with local currency sovereign bond yield. Two of the three approaches include diverse research on analyzing sovereign default separately, Saji (2021) reports that bond yield spread estimation by integrating into the sovereign ratings increases the statistical significance of the indicators, which are predictors of sovereign default. The last sovereign default risk measurement method utilizing credit default swaps is analyzed by Zhang et al. (2019) and the research reports the effect of macroeconomic factors on credit default swaps. Similar to Saji (2021), Zhu (2006) compares the two risk measurement techniques: bond spread and credit default swaps. It is concluded that bond spreads and CDS spreads move together in the long run.

At the beginning of the 2000s, although exchange rate factors were excluded from the possible reasons for sovereign default by Goldstein et al. (2000), after a decade or so Gadanecz et al. (2014) report that exchange rate factors are significant determinant factors of sovereign default, in the case of sovereign default is proxied with local currency government bond yield. Similar to Gadanecz et al. (2014), in this thesis, the impact of exchange rate factors is analyzed as a determinant factor of sovereign default, and the default is proxied by the third measurement technique with credit default swap spreads.

Since the relationship between exchange rate and sovereign default is reported by Gadanecz et al. (2014) by proxying local currency sovereign bond yield and in this research sovereign default is proxied by credit default swap spreads then initially, the link between two indicators is analyzed graphically. The credit default swap spread 5-year and exchange rate relationship is analyzed for the period between 1995 and 2020. Analysis is done for all countries, advanced countries, developing countries, emerging countries, financial countries, and non-financial countries. Comparing the beginning of the period with the end of the period, it is obtained that credit default swaps follow a falling path, but the exchange rate presents a rising path. For advanced countries, credit default swaps exhibit a rising path, on the other hand, the exchange rate follows a falling path. In the case of developing countries, credit default swaps show a falling path and the exchange rate follows a rising path. For emerging countries, credit default swaps show a falling trend, and conversely, the exchange rate shows a rising trend. For financial centers, credit default swaps have a rising path, but the exchange rate shows a falling trend. For the non-financial centers credit default swaps follow a falling trend on the other hand exchange rate follows an increasing path.

. In forming our empirical model, we follow the advice of Saji (2021) and select the explanatory factors from three leading credit rating agencies: Standard and Poor's, Moody's, and Fitch's data set with the restriction of the publicly available data. Following this approach, our data set consists of exchange rate factors, domestic factors, and international factors. The vast of the literature applied panel data fixed effect estimation. While we follow the prior research estimation technique, we also applied the Hausman Test with random effect estimation, and the results support that it is necessary to apply panel data fixed effect estimation procedure. Our data set consists of two main groups the first one is all-countries and the second one is EMEs. The data set is constructed to allow comparison between two different sets, the first one includes all country types and allows independence from a country's type to interpret the factors' impact, and the second group is constructed according to the prior research as Lorca et al. (2021), which reports capital flows have an impact on EMEs more than they have on the other countries.

By applying this procedure, we aimed to find whether the exchange rate has any impact on sovereign default or not. And then, it was aimed to investigate whether the impact changes depending on the country type or not. It was planned to analyze the effect of the exchange rate regime on the link between the exchange rate and sovereign default. Also, it was targeted to analyze whether capital openness has any effect on the relationship between exchange rate and sovereign default.

In Chapter 3, we investigated the main determinants of sovereign default and target to answer whether the exchange rate has any effect on sovereign default or not. To this end, we maintain three main indicator groups: exchange rate factors, domestic factors, and international factors. While domestic factors are significant for all countries set, comparatively they are more significant in the analysis of EMEs in determining credit default swaps. For both all-countries set and Emerging market economies, FDI to GDP ratio has the highest marginal impact on credit default spread in domestic indicators. The case for international factors is as follows: VIX is a significant determinant factor, that has a nearly similar marginal impact on credit default swap spread.

It is obtained that the impact of factors of exchange rate shows dissimilar behavior depending on the country set. For all types of countries, which consist of advanced countries, emerging countries, developing countries, and financial and nonfinancial centers, the official exchange rate is a significant determinant of credit default swaps, when estimations are made including domestic and international determinant factors in the model. The empirical analysis suggests that for the EMEs' estimation results, both the official exchange rate and exchange rate risk (proxies by exchange rate volatility) are vital determinant factors for credit default swaps when estimations are done both including and excluding domestic and international factors in the model.

According to the estimation results of fixed effects panel models for credit default spreads, for all countries, for the five different models applied considering the Akaike information criteria, the model should include exchange rate factors, domestic factors, and international factors. While the exchange rate factor is a significant determinant factor of sovereign default, considering the domestic factors,

especially FDI to GDP's marginal impact is higher than the other analyzed indicators, and evaluating the international factors, particularly VIX is a consistently statistically significant determinant factor of sovereign default for all-countries data set.

When the estimation results of fixed effects panel models of credit default spreads for emerging market economies are considered, five different models are estimated, and depending on Akaike information criteria, the model should consist of exchange rate factors, domestic factors, and international factors. In emerging market economies' estimations, both exchange rate and exchange rate volatility are statistically significant determinant factors of sovereign default. Similar to the all-countries case, evaluating domestic factors, especially the FDI to GDP's marginal effect is higher than the other analyzed factors, and for international factors, particularly VIX is consistently a statistically significant determinant factor of sovereign default for emerging market economies data set.

According to estimation results of fixed effects panel models, it is obtained that exchange rate factors' impact shows differences among all countries and EMEs data sets. While the exchange rate is only the statistically significant determinant factor for all countries, in addition to this, the exchange rate volatility is also a statistically determinant factor of sovereign default in Emerging market economies. The domestic factors show similar behavior in terms of marginal impact for both groups and also regarding the international factors, especially VIX's impact is the same for both groups.

As robustness analysis, potential reverse causality is analyzed, which is the main reason for the endogeneity. Following Liu et al. (2012) we apply 1 lag SGMM and 2 lag SGMM model for both all-countries and EMEs countries set. Depending on the all-countries set estimation results, the marginal impact of the exchange rate factors decreases, on the other hand, both domestic factors and international factors show differences in terms of rising and falling marginal effects. According to EME countries' set estimation results, for the exchange rate, domestic and international factors marginal effects change without following a path. Our potential causality results are similar to Gadanecz et al. (2014).

The following extension is the exchange rate regime, exchange rate regime data is obtained from Reinhart et al. (2021) online data source. For the all-countries case, regarding the exchange rate factors, domestic factors, and international factors, marginal contributions are affected by the separation according to the exchange rate regime. Depending on the estimation results of EMEs, marginal impacts of the exchange rate factors and international factors on credit default spread are affected by the exchange rate regime separation. Our estimation results are in a similar vein to Gadanecz et al. (2014), which reported that the exchange rate regime has an impact on the credit default spread.

In addition to this, when the impact of capital openness on the credit default swap and exchange rate is analyzed, results show that while high capital openness increases the significance of exchange rate factors for all countries set, on the other hand, the significance of exchange rate factors increases for low capital openness for EMEs. Those results are in a similar vein to Lorca (2021) that the sovereign default determinant factors are also affected by capital account openness.

The last robustness check is done for capital openness and both all countries and EMEs sets are divided into two separate country groups according to capital openness as high capital openness and low capital openness. According to estimation results of all countries, capital openness affects the marginal contribution of exchange rate factors, domestic factors, and international factors. Depending on the estimation results of EMEs, capital openness affects the marginal contribution of exchange rate factors, domestic factors, and international factors. Our estimation results are similar to Ogrokhina et al. (2019) who claim openness is significantly essential for sovereign default.

In addition to this, the impact of the exchange rate regime on sovereign default determinant factors is analyzed. Different from the analysis of capital openness, a flexible exchange rate regime shows a similar effect for both country sets by increasing the significance of exchange rate factors for all countries and EMEs. Those results support the view of Domac et al. (2000) that claims sovereign default determinants depend on the exogenous factors, particularly, the exchange rate regime.

Our findings are also in parallel with those in the literature as Gadanecz et al. (2014) regarding the relative significance of domestic and global drivers in cases of all countries and EMEs considering determinant indicators of credit default swaps spreads. Domestic factors, particularly, external debt stocks to GDI, official reserves to GDP, and FDI to GDP ratio are crucial determinants of credit default swaps for both countries and EMEs cases. However, the credit default swaps are also affected by global social and monetary conditions.

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APPENDICES

A. DATA SOURCES AND COUNTRY LISTS AND THEIR CLASSIFICATIONS

A. Panel A: Moody's Variable List			
Sno	Determinant	Variable	Definition/Measure
1.	Economic Strength	Average Real GDP Growth	Calculated Avet-rage of Real GDP Growth for t-4 to t years
2.	Economic Strength	Volatility in Real GDP Growth	Standard deviation of real GDP Growth from t-9 to t years
3.	Economic Strength	Global Competitiveness Index	As defined by World Economic Forum
4.	Economic Strength	Nominal GDP(US$)	Natural log of nominal GDP (US$) for previous year
5.	Economic Strength	GDP per capita (PPP, $ US) t-1	GDP per capita, PPP (current international $) t-1
6.	Economic Strength	Diversification	10000-Herfindahl concentration Index. Herfindahl concentration Index is given by $\sum s_i^2$ where, i= 1 to n s_i is contribution of each sector (mkt share of each firm), n is number of firms.
7	Institutional Strength	Government Effectiveness Index	Obtained from World Bank
8	Institutional Strength	Rule of Law Index	Obtained from World Bank
9	Institutional Strength	Control of Corruption Index	Obtained from World Bank
10	Institutional Strength	Inflation Level	Average of the Inflation, consumer prices (annual %) from t-4 to t years

11	Institutional Strength	Inflation Volatility	Standard deviation of Inflation, consumer prices for Year t-9 to t
12	Fiscal Strength	General Government Interest Payments/Revenue	Interest payments (% of revenue)
13	Fiscal Strength	General Government Interest Payments/Revenue	Interest payments (current LCU) / GDP (current LCU) *100
14	Susceptibility to Event Risk	Domestic Political Risk	World Bank Voice and Accountability Index
15	Susceptibility to Event Risk	Size of Banking System	Domestic Credit to Private Sector by bank (%of GDP)
16	Susceptibility to Event Risk	(Current Account V-Balance+FDI)/GDP	(Current Account Balance+ FDI)/GDP*100
17	Susceptibility to Event Risk	Net International Investment Position/GDP	Net Foreign Assets current LCU/GDP current LCU)*100

Panel B: S&P Variable List			
Sno	Determinant	Variable	Definition/Measure
1.	Political Score Indicators	World Governance Indicators	World Bank Indices: Government Effectiveness Index, Rule of Law Index, Control of Corruption Index ,Voice and Accountability Index ,Political Stability and Absence of Violence/Terrorism Index ,Regulatory quality index
2.	Economic and Monetary Indicators	GDP per Capita	GDP per Capita (current USD)
3.	Economic and Monetary Indicators	Real GDP per Capita	Real GDP per Capita(%change)
4.	Economic and Monetary Indicators	Consumer Price Index	Inflation consumer prices (annual %)
5.	Economic and Monetary Indicators	Depository Claims	Claims on private sector (annual growth as % of broad money)

6.	Economic and Monetary Indicators	Monetary Base	Liquid liabilities(M3) as % of GDP
7	External Score Indicators	Current Account Receipts	Net current transfers from abroad (current LCU) +compensation of employees (current LCU) + exports on goods and services (current LCU)
8	External Score Indicators	Official Reserves	Total reserves (include gold, current US$))
9	External Score Indicators	Gross External Financing needs (% of CAR plus usable reserves)	Import of goods and services (US$) +external debt stocks (short term (Current US$) + Total reserves(include gold, current US$))
10	External Score Indicators	Narrow Net External Debt/CAR (%)	External debt stock (% of GNI)
11	External Score Indicators	Current Account Balance/CAR (%)	Current account balance (Bop, current USD$)/ CAR*100
12	External Score Indicators	Net Foreign Direct Investment (FDI)/GDP (%)	Foreign direct investment, net to GDP
13	External Score Indicators	Terms of Trade	Terms of trade adjusted (constant LCU)
14	Fiscal Score Key Indicators	General Goverment	General Government primary net lending/borrowing
15	Fiscal Score Key Indicators	Net General Goverment Debt/GDP (%)	General government net lending/ borrowing to GDP
16	Fiscal Score Key Indicators	General Goverment Interest / General Goverment Revenues (%)	Central government debt, total (% of GDP)

Panel C: Fitch variable			
Sno	Determinant	Variable	Definition/Measure
1.	Macroeconomic	Consumer price Inflation	Average of Inflation, consumer prices from t-2 to t years
2.	Macroeconomic	Real GDP Growth	Average of GDP growth from t-2 to t years

3.	Macroeconomic	Real GDP Growth Volatility	Natural log of the 10-year standard deviation (t-9 to t) of average annual change in GDP.
4.	Public Finances (general government)	Interest Payments	Average of Interest payments as a % of revenue from t-2 to t years
5.	External Finances	Commodity Dependence	Calculated as 1-Manufactures exports (% of merchandise exports)
6.	External Finances	Current Account Balance plus net foreign direct investment	Calculated as average of (Current Account Balance + FDI) / GDP * 100 from t-2 to t years
7	External Finances	Official International Reserves	Total reserves expressed in terms of the number of months of imports of goods and services they could pay for
8	Structural	Money Supply	Natural log of broad money relative to GDP
9	Structural	GDP per capita	Natural log of GDP per capita in current US dollars
10	Structural	Composite Governance Indicator	Average percentile rank of World Bank governance indicators: 'Rule of Law'; Effectiveness'; Corruption'; Accountability'.

Table: Country List

Financial Centers	Non-Financial Centers				
	Advanced Economies	Emerging Market Economies		Developing Economies	
Belgium	Australia	Argentina	Jordan	Belarus	Moldova
Ireland	Austria	Bangladesh	Kazakhstan	Bolivia	Mongolia
Netherlands	Canada	Bosnia and H.	Kenya	Burkina Faso	Niger

Singapore	Denmark	Botswana	Korea R.	Costa Rica	Palau
United Kingdom	Finland	Brazil	Lithuania	Cote d'Ivoire	Senegal
Mauritius	France	Bulgaria	Malaysia	Djibouti	Swaziland
	Germany	Chile	Mexico	Dominican R.	Togo
	Greece	Colombia	Morocco	Ecuador	Ukraine
	Italy	Croatia	Nigeria	Fiji	Uruguay
	Japan	Czech R.	Pakistan	Georgia	Venezuela
	New Zealand	Egypt	Peru	Guatemala	
	Norway	Estonia	Philippines	Guyana	
	Portugal	Hungary	Poland	Haiti	
	Spain	India	Romania	Honduras	
	Sweden	Indonesia	Russia	Latvia	
	United States	Israel	Serbia R.	Macedonia	
		Jamaica	Slovak R.	Malawi	
		Slovenia	Thailand	Mali	
		South Africa	Turkey		
		China			

Source: MSCI Country Classification

Table : The de facto ERR Classification

	Fine	Coarse
No separate legal tender	ERR1	ERR1
Pre announced peg or currency board arrangement	ERR2	
Pre announced horizontal band that is narrower than or equal to +/-2	ERR3	
De facto peg	ERR4	
Pre announced crawling peg	ERR5	ERR2
Pre announced crawling band is narrower than or equal to +/-2%	ERR6	
De facto crawling peg	ERR7	
De facto crawling band that is narrower than or equal to +/-2%	ERR8	
Pre announced crawling band that is wider than or equal to +/-2 %	ERR9	ERR3
De facto crawling band that is narrower than or equal to +/-5%	ERR10	
Moving band that is narrower than or equal to +/- 2% (i.e., allows for both appreciation and depreciation over time)	ERR11	
Managed floating	ERR12	
Freely floating	ERR13	ERR4
Freely falling	ERR14	ERR5
Dual market in which parallel market data is missing	ERR15	ERR6

Source: Ilzetzki et al.(2017)

B. CURRICULUM VITAE

Tuğba Sağlamdemir

PERSONAL INFORMATION

Date of Birth : [redacted]
Place of Birth: [redacted]
Permanent Address : [redacted]
Languages : Turkish(Native), English (Advanced),

EDUCATIONAL INFORMATION

PHD in Middle East Technical University Institute of Social Sciences Department of Economics
(09/2013-06/2024) (GPA:3.5/4.00)

MA in Dokuz Eylul University Institute of Social Sciences Department of Economics (09/2009 – 08/2013)(GPA:3.65/4.00)

Thesis: Is It Time for Action (?) : Loss Minimization in Crisis Prediction
Thesis Advisor: Prof. Dr. Saadet Kasman **Second Reader:** Prof. Dr. Pınar Narin Emirhan

MA in Bilkent University Faculty of Economics Administrative and Social Sciences Department of Economics (09/2010 – 10/2012) (GPA:3.09/4.00)

Thesis: Predicting Crisis: This Time is Different (?)
Thesis Advisor: Doç. Dr. Selin Sayek Böke **Second Reader:** Doç. Dr. Fatma Taşkın

BS in Dokuz Eylul University Faculty of Business Department of Economics (English) (09/2005 – 06/2009) (GPA:3.30/4.00)(with 3rd rank of 50)

Anadolu University Open Education International Trade Program (Double Major Program) – (09/2007 – 05/2010)

Aydin- Suleyman Demirel Anatolian High School (2001-2005) (5.00/5.00)(with 1st rank of 200 students).

COMPUTER KNOWLEDGE

Operating Systems and Tools : MATLAB, Stata, Eviews, Microsoft Windows, Microsoft Office Tools (Word, Excel, Power-point, Access**)**

JOB EXPERIENCE

Teaching Assistant in Beykent University Economics Department (English) (10/2017-2020)

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C. TURKISH SUMMARY / TÜRKÇE ÖZET

Kriz birbirinden farklı bir çok durumu tanımlamak için kullanılmakta olan bir terimdir. Son yıllarda farklı zamanlarda ve yerlerde yaşanmış ve kriz olarak tanımlanan durumlara baktığımızda 1990lar da Asya'yı, 2000lerde Latin Amerika'yı ve 2007 yılından itibaren global olarak tüm dünyayı etkisi altına almış olan durumlar kriz kelimesi ile tanımlanmış ve sonucunda ortaya çıkan durumlara yönelik eylem ve önlemler bu krizlerin etkilerini bulgularla nitelenebilir hale getirmiştir. Son yıllarda yapılan çalışmalar, krizlerin benzerlik ve farklılıklarını, sebep olmuş olduğu etkileri önlemek için bunların tahmin edilebilmesini, bu tahminlemeler de farklılık oluşturabilecek koşulların bulunup değerlendirilmesini kapsamaktadır. Krizlerin belirli ülke grupları içinde görülme sıklığının kriz türlerine göre ayrıştırılıp incelenmesi ve görülmekte olan en sık krizin belirlenmesi. Bu kriz türünün ölçümlenebilme methodunun belirlenerek bu kriz türüne sebep olan faktörlerin incelenmesi ve kriz ile sebep olan faktörler arasındaki ilişkiyi etkileyen faktörlerin göz önüne alarak bu ilişkinin bu koşullar altında araştılmasını önemli kılmaktadır ve bu tezin araştırma konusunu oluşturmaktadır.

Literatürde yapılmış olan araştırmalara bakıldığında kriz tanımlamalarındaki faklılığın ortaya çıktığı durumlardan biri olan "döviz krizi", Dornbush vd.(1995) tarafından tanımlandığında, aşırı değerlenme son derece istikrarsız olduğunu ve bunun kuralsızlaştırılmış bir finansal ortamda onun finansal daralmaya sebep olduğunu ve bunu takiben mali bozulmaların ve reel aktivitelerin düştüğünü söylüyor. Döviz krizinin farklı bir perspektiften tanımlaması ise is Kaminsky vd. (1998) tarafından yapılıyor, bu tanımlamaya göre ise buna göre bir durumun kriz olarak değerlendirilebilmesi için ihracat değerlerinde, uluslararası rezervlerde, üretim miktarlarında, hisse senedi fiyatlarında reel döviz kurlarında eğilimden çok büyük değişimler olmalıdır.

Reinhart vd.(2008) ve bu çalışmada da kullanılan kriz tanımlamalarının yapılmış olunan kriz tanımlara göre krizler: bankacılık krizi, sistemik kriz, döviz krizi,

enflasyon krizi, iç borçlanma krizi ve dış borçlanma krizidir. Tablo 2 de de özetlenmiş olan bu tanımlamalara göre: bankacılık krizinin başlangıcını para çekmeler ve banka hücumları olarak belirleniyorsa, bu koşullar altında banka mevduatlarındaki değişiklikler krizin tarihini belirlemek için kullanılmaktadır. Sistematik krizi ise bankacılık krizinde ortaya çıkmakta olan iki durumun aynı anda olması ile birlikte olmaktadır bunlar: iki tür olaydan biriyle belirlenmektedir: (1)bir veya daha fazla mali kurumun kapatılmasına, birleşmesine veya kamu sektörü tarafından devralınmasına yol açan banka hücumları, (2) önemli bir finans kuruluşunun(veya kurumlar grubunun) kapatılması, birleşmesi, devralınması veya büyük ölçekli devlet yardımı olmaması durumunda, diğer finansal kuruluşlar için benzer sonuçlar dizisinin başlangıcını işaret eder. Döviz krizlerine tanımlamaya yönelik endeksler, tamamen döviz kurundaki değişikliklere dayanan tek değişkenli endekslerden ilgili çapa para biriminin belirli bir eşiğin üzerinde değer kaybetmesi döviz rezervi zararlarını içerecek şeklide iki değişkenli ve savunmasını da yakalamak için kısa vadeli bir politika faizi ekleyen üç değişkenli model. Enflasyon krizlerinin tanımlamasına baktığımızda ise belirli bir eşiğin üzerinde yıllık (veya 12 aylık) enflasyon oranı. Çok yüzyıllıklı fiyat öncesi para kapsamı nedeniyle Reinhart vd. (2009) yılda yüzde 20 olarak uyguluyor. Modern dönem odaklanılan referansta bulunulan diğer çalışmalarda yıllık yüzde 40 eşik değeri olarak kullanılıyor. İç borçlanma krizi tanımlamasına baktığımızda, İç borçlanma krizinin tanımına baktığımızda devletin dış borcunu ödeme yükümlülüğünde temerrüde düşmesi, ancak bunun aynı zamanda banka mevduatlarının zorla dönüştürülmesi ya para birimin ya da vadelerinin ve diğer koşulların değiştirmesi gibi başka belirtileri de olabilir. Dış borçlanma krizi ise genellikle, borçlu ülkeler tarafından yaşanan ödeme zorluklarına koordine edilmiş ve sürdürebilir çözüm bulmak amacıyla büyük kreditör ülkelerin oluşturduğu bir grup olan Paris Kulubü borçların yeniden planlanmasını alacaklılarıyla bağlantılı olarak yapılan düzenlemedir.

Kriz literatüründe yapılmış olan çalışmalara baktığımızda bu alanda yapılan çalışmalardan Kaminsky vd. (1998) döviz kuru krizlerini ve bu krizi etkileyen faktörlerin araştırılmasını yapmıştır. Laeven vd. (2008) ise sistematik bankacılık krizi ve onun diğer krizlerle olan ilişkisini incelmiştir. Reinhart vd. (2008) ise birçok krizin finansal serbestleşme ile ortaya çıktığını Amerika da başlamış, birçok Avrupa

ülkesine, İspanya, Birleşik Krallıklar ve İrlanda da aynı anda ortay çıkmıştır. Reinhart vd. (2008) gerçekleşmiş olan krizin tüm ülkeler etrafında benzerlikleri olduğunu göstermiştir. Reinhart vd. (2010) yayılma etkisi ile birlikte kamu ve özel borç döngüleri arasındaki ilginin son iki yüzyılı kapsayan dönem için benzerlik gösterdiği sonucunu göstermiştir.

Bu çalışmada kriz analizine ilişkin temel veri kaynağı IMF veri tabanı için de kullanılan Reinhart vd. (2008) tarafından yıllık olarak hazırladığı veri seti olarak kullanılmıştır. Bu veri setinin zaman aralığını değerlendirmesi ve bölümlere ayırmasında baz alınan faktör ise kamu borcunun dönemler arasında göstermiş olduğu değişim ve kırılmalar üzerinden alt dönemlere ayrılarak bu anliz yapılmıştır. Temel alınan veri setine göre tanımlanan Devlet borcu olarak bir ülke hükümetinin borcu olarak tanımlanır. Bu borç genellikle hükümet tarafından ödenen tahvillerle kapatılır. Devlet borcu, hükümet borcu ile karşılaştırılabilir. Her iki borç türü de hükümete ait olsa da, para birimi bakımından farklılık gösterirler. Tahviller söz konusu olduğunda, bir ulusun para birimi cinsinden ödenirler. Bunun bir sonucu olarak, bu borç genellikle bir ülkenin ekonomik sınırları içinde inşa edilir. Devlet borçları ise yabancı para cinsinden ihraç edilen tahvillerden veya uluslararası finans kuruluşlarından alınan kredilerden oluşur. Hem yerli hem de yabancı kreditörlere ait borçların toplamı "ulusal borç" olarak kabul edilir. Devlet borçları geri ödeme vaadiyle alınmakla birlikte, bazı durumlarda geri ödeme gerçekleşmemekte ve devlet borçları devletin temerrüdü ile sonuçlanmaktadır.

Bu veritabanı 1800 ile 2016 yılları arası zaman aralığını kapsamaktadır. Yıllık olarak hazırlanmış olan veri setini içeren zaman arlığı için IMF Finans ve Kalkınma Raporu (2021), ülke borçlarının 1880'den bu yana geliştiğini, finansal küreselleşmenin ilk döneminde (1880-1913) gelişmiş ekonomilerde borç oranının 1880'de GSYH'nin yüzde 45'inden 1913'te GSYH'nin yüzde 29'una düştüğünü belirtmektedir. Bu dönemde hakim olan altın standardı, ülke borç oranlarını düşürürken büyümeyi teşvik eden, örneği görülmemiş özel sermaye girişleri ve ticaret girişleri ile ilişkiliydi. İkinci dönem, Birinci Dünya Savaşı'nın başladığı 1914 yılında borcun GSYH'nin yüzde 23'ü gibi şimdiye kadarki en düşük oranına ulaşmasıyla başlar. Öte yandan, borç daha sonra tırmanmaya başlamıştır. Birinci Dünya Savaşı (1914-18) ve

ardından gelen mali kriz, gelişmiş ekonomilerde borç artışına neden olmuştur. 1920'ler boyunca borçlardaki düşüşü, Büyük Buhran (1930'ların başı) ve İkinci Dünya Savaşı (1941-45) ile ilgili iki artış daha takip etmiştir. Üçüncü dönem, çeşitli bankacılık ve döviz krizlerinin ardından borç oranının GSYH'nin yüzde 80'ine ulaştığı Büyük Buhran sırasındaki 'Büyük Zirve' olarak tanımlanmaktadır. Büyük Buhran'ın 1930'ların ortalarından sonlarına doğru sona ermesi borçların azaltılmasıyla birlikte gerçekleşmiştir, öte yandan İkinci Dünya Savaşı'nın başlangıcı bir bitiş olarak durmaktadır. Çeşitli ülkelerin savaş ödemelerini sübvanse etmek için aşırı derecede borç almasıyla, gelişmiş ekonomi borçluluğu veri tabanında kayıtlı en yüksek seviyeye yükselmiştir: 1946'da GSYH'nin yaklaşık yüzde 150'si. Son krizin büyüme üzerindeki etkisi Büyük Buhran'ınkinden daha az etkili olsa da, devlet borçlarına ilişkin argümanın daha ağır olduğu açıktır. Bu, gelişmiş ekonomilerin trendin başlangıcındaki devalüasyonunun sonucudur. 2007'de gelişmiş G-20 ekonomilerinde borç oranları 1928'e kıyasla GSYH'nin yüzde 20 puan üzerindedir. Bunun yanı sıra, enerji ve finans sektörleri cirolarının sağlanmasındaki önemli düşüş ve maliyet, Buhran boyunca borç oranlarına daha sert bir şekilde ulaşmıştır. Küresel mali kriz dünya ekonomisini, özellikle de gelişmiş ekonomilerin kamu maliyesini olumsuz etkilemiştir. GSYİH'nın bir parçası olarak kamu borcu son zamanlarda aşırı derecede artmış, 2000 yılında yüzde 70 iken 2009 yılında yüzde 100'e yükselmiştir.

Kamu borcunun zaman içindeki değişimi Reinhart vd. (2011) tarafından değerlendirilmiş ve gelişmiş ekonomilerde kamu borcunun son dönemlerde İkinci Dünya Savaşı'nın sonundan bu yana kaydedilmemiş seviyelere kadar dalgalandığı belirtilmiştir. Gelişmiş ekonomilerin tamamı için ortalama kamu borcu/GSYİH oranı, 2010 yılının başından sonuna kadar, İkinci Dünya Savaşı'nın hemen öncesinde, Birinci Dünya Savaşı ve Büyük Buhran sırasında ulaşılan zirvelerde seyretmiştir. Öte yandan, Reinhart vd. (2003) gelişmekte olan piyasa ülkeleri için büyük kamu borcu artışlarının hızlı ve nadiren daraltıcı bir şekilde başlamadığını ortaya koymaktadır. Özellikle borcun GSYH'ye oranı, istikrarlı ve güçlü ekonomik büyüme boyunca nadiren tamamen azalır. Devlet borçlarının bir kriz nedeni olarak tanımlanması, Reinhart vd. (2010) tarafından devlet borçlarının etkileri üzerine yapılan araştırmayı desteklemektedir.

Bu veri seti ayrımına göre yıllık olarak yayınlanan kriz verisini 1800 ile 2016 yılları arası için yapılmaktadır. Analizin yapılması sırasında 1800 ile 2016 zaman aralığı dönem içinde meydana gelmiş olan ve bir çok ülkeyi aynı anda etkilemiş olan: Birinci Dünya Savaşı(1914-1918), Büyük Buhran(1929), İkinci Dünya Savaşı (1939-1945), Birinci Petrol Krizi (1973), İkinci Petrol Krizi (1979) ve Büyük Durgunluk(2008)olayları ayrı dönemler içerisinde inceleyerek, bu olayların krizlerin olma oranları üzerindeki etkisi gözlemlemek amacıyla dönem 25 er yıllık dönemler olacak 9 alt inceleme dönemlerine ayrılmıştır. BU analizin incelendiği ülke gruplarına bakıldığında ise bu ülke ayrımları IMF ile ülke ayrımını paralel olarak yapmakta olan MCSI ülke ayrımı ile benzer olarak yapılmaktadır. Tablo 3 te görüleceği gibi ülke ayrımı 6 farklı ülke gruplaması üzerinden yapılmaktadır. Ülke grupları: tüm ülke grupları, finans merkezleri, finans dışı (finansal olmayan) merkezler, gelişmiş ülkeler, gelişmekte olan ülkeler, yükselen piyasa ülkeler olmak üzere sınıflandırılmıştır.

Bu bağlamda tezin amacı Reinhart vd. (2008) veri setinin kullanarak tanımlanmış olan krizlerin belirlenmiş olan ülkeler için verilen zaman aralığında değişiminin analizinin yapılmasıdır. Analiz sonucu elde edilen bulgularla cevaplanması planlanan sorular ise: her bir kriz için incelenmekte olan ülkelerde yaşanan kriz yıllarının oranın hesaplanması, belirleyici olarak tanımlanan olayların olduğu dönemlerde analizi yapılan ülkelerde yaşanan kriz yıllarını oranın nasıl değiştiği analiz yapılacak. İncelenmekte olan ülke grubu için bakıldığında yaşanan krizlerden hangisinin oranın yüksek olduğu sonucuna ulaşılması, Tüm ülke grupları için bakıldığında yaşanan tüm kriz oranlarına bakıldığında en çok görülen krizin hangisi olduğu soncuna ulaşılmasıdır.

Tüm ülke grubu için belirleyici olayların etkisini incelediğimizde, tüm krizler için yapılmış olan analizde Birinci Dünya Savaşı tüm krizler içesinde sistematik kriz oranın artmasına neden olmuştur, Büyük Buhran ise tüm krizler içerisinde iç borç krizin oranın artışına sebep olmuştur. Birinci Petrol Krizi de iç borç krizi oranını arttırmıştır. İkinci Petrol Krizi ise Bankacılık krizinin oranın artmasını sağlamıştır.

Gelişmekte olan ülkelere baktığımızda, tüm krizler için yapılmış olan analizde Birinci Dünya Savaşının döviz krizini, Büyük Buhranın Enflasyon krizi oranı,

Birinci petrol Krizinin iç borç krizi oranını ve İkinci Petrol Krizinin Bankacılık Krizinin görülme oranını arttırmıştır. Gelişmiş olan ülkelerin analizine baktığımızda, tüm krizler için yapılmış olan analiz sonuçlarına göre, Birinci Dünya Savaşı enflasyon krizinin, Büyük Buhran ise dış borç krizinin, İkinci Petrol Krizi ise enflasyon krizinin ve Büyük Durgunluk ise Sistemik Krizin görülme oranını diğer tüm krizlerden daha fazla arttırmıştır. Yükselen piyasa ekonomilerin durumuna baktığımızda ise, tüm krizlerin olduğu durumda Birinci Dünya Savaşının döviz krizi, Büyük Buhran ise dış borç krizinin, Birinci Petrol Krizi ise döviz krizinin, İkinci Petrol Krizi Bankacılık krizinin yaşanma oranını arttırmıştır. Finans merkezlerinin kriz analizi sonuçlarına göre, tüm krizlerin olduğu durumda Birinci Dünya Savaşının enflasyon krizinin, Büyük Buhran ve Birinci petrol Krizi döviz krizinin, İkinci Petrol Krizi ve Büyük Durgunluk ise bankacılık krizinin görülme oranını arttırmıştır. Finans Dışı (Finansal Olmayan) merkezlerin analiz sonuçlarına göre ise tüm krizlerin olduğu durumda Birinci Dünya Savaşı ve Büyük Buhran döviz krizini, Birinci Petrol Krizi ise Sistemik Krizin, İkinci Petrol Krizi ise bankacılık krizinin görülme oranını arttırmıştır.

Analizi yapılmış olan olayların tüm ülke grupları üzerinde olan etkisine baktığımızda, tüm krizler içerisinde Birinci Dünya Savaşı ve Büyük Buhranın döviz krizinin, Birinci petrol Krizinin ise iç borç krizinin, İkinci Petrol Krizinin ise Bankacılık Krizinin görülme ihtimalini arttırdığı sonucuna ulaşılmıştır.

IMF tarafından ülke borç oranlarının yüksek seviyelere ulaşıldığı olaylar bazında ülke grupları ortay çıkmış olan krizlerin değerlendirilmesinin ardından , arraştırma analizi yapılan ülke grupları için bankacılık krizi, sistematik kriz, döviz krizi, enflasyon krizi, temerrüde düşen iç borç ve devlet dış borç temerrüdünün araştırılması için krizin tanımlayıcı analizinin bir tartışmasını sunmaktadır. Bu amaçla, 1800-2016 dönemi boyunca tüm ülkeler, finansal merkezler, finansal olmayan merkezler, gelişmiş ülkeler, gelişmekte olan ülkeler ve gelişmekte olan ülkeler için dengesiz yıllık panel verileri dikkate alınmıştır. Analiz sonucu elde edilen bulgulara göre, tüm ülkeler, gelişmekte olan ülkeler ve finansal olmayan merkezler grupları için en sık görülen kriz türünün devlet dış borcu olduğunu ortaya

koymaktadır. Gelişmiş ve gelişmekte olan ülkeler için en sık rastlanan kriz türü döviz krizi iken, finans merkezleri için en sık rastlanan kriz türü bankacılık krizidir.

Analizle ulaşılan sonuçlara göre, tüm ülkeler, gelişmiş ülkeler, gelişmekte olan ülkeler, finansal olmayan merkezler ve finansal merkezler için en az sıklıkta görülen kriz türünün temerrüde düşen iç borçlar olduğunu bildirmektedir. Ayrı olarak, gelişmekte olan ülkeler için en az sıklıkta görülen kriz türü sistematik krizdir. Bu bölüm, Reinhart vd. (2008) bakış açısına benzer şekilde, krizlerin birbirinden farklı olduğunu, ancak benzerliklerinin de bulunduğunu ortaya koymuştur. Bu nedenle, en sık görülen kriz türünü analiz etmek aynı zamanda diğer tüm kriz türleriyle de ilgilenmek anlamına gelmektedir. Tahmin sonuçlarına bağlı olarak, devlet dış borcu en sık görülen kriz türüdür. Bu krizin analiz edilmesi aynı zamanda diğer kriz türleri hakkında da bazı öneriler sunulmasına yardımcı olacaktır.

Krizi incelemesi sonucu elde edilen bulgular, enflasyon krizi hariç tüm ülke setleri için; bankacılık krizi, sistematik kriz, döviz krizi, temerrüde düşen iç borç ve devlet dış borç krizinin gözlemlenen kriz yılları oranının incelenen 2016 döneminin başından sonuna kadar göreceli olarak arttığını rapor etmektedir. Bu sonuçlara ek olarak , yükselen piyasa ekonomileri için araştırılan tüm kriz türleri dönem başından dönem için tüm dönem ortalamasına bağlı olarak devlet dış borcu araştırılan gruplar arasında en çok gözlemlenen kriz türüdür. Reinhart vd. (2008) krizlerin tanımlama olarak birbirinden farklı olduğunu, ancak bir çok benzerliklerinin de bulunduğunu iddia etmektedir.

Tüm ülkeler, gelişmekte olan, yükselen piyasa ekonomileri ve finansal olmayan ülkeler için tüm dönem ortalamasına bağlı olarak araştırma grupları arasında en çok gözlemlenen kriz türünün devlet dış borcu olduğu bildirilmektedir. Öte yandan, gelişmiş ülkeler için döviz krizleri, finans merkezleri için ise bankacılık krizleri en çok görülen kriz türüdür. Herhangi bir kriz türünün gerçekleşme olasılığı, incelenen dönem boyunca yükselen piyasa ekonomilerive düşen bir eğilim ortaya koymaktadır.Her bir krizin gerçekleşme sıklığı ülke grupları arasında farklılıklar gösterirken, devlet dış borç krizlerinin oranı analiz edilen grupların yarısından fazlası için diğer kriz türlerinden daha yüksektir. Bu sonuçlar doğrultusunda kriz üzerine

çalışarak ilerleyeceğimiz bu çalışmada, araştırılmış olan dönem ve ülke grupları için de en sık rastlanan kriz olan Devlet dış borç krizine odaklanarak analizimizi sürdüreceğiz.

Kamu borcunun içeriğine baktığımızda devlet iç borçlanması ve devlet dış borçlanmasını içermektedir. Literatürde bu alanda yapılmış çalışmalara ve bulgularına baktığımızda kamu borçlanmasının büyüme üzerine odaklanan çalışmalar öne çıkmaktadır. Bu çalışmalar: Reinhart vd. (2010) nin yapmış olduğu araştırmaya göre Kamu borcu enflasyon ve büyüme arasındaki ilişkinin incelendiği bu araştırmada, hem gelişmiş hem de gelişmekte olan piyasalar için yüksek borç/GSYİH seviyelerinin önemli ölçüde daha düşük büyüme sonuçlarıyla ilişkili olduğu sonucuna varılmıştır. Çok daha düşük dış borç/GSYİH seviyelerinin, gelişmekte olan ülkeler için olumsuz çıktılarla bağlantılı olduğu da eklenmiştir. Ülke temerrüdünün büyüme üzerindeki etkisini inceleyen bir diğer çalışma ise Kumar vd. (2010) tarafından analiz edilmiş ve Cecchetti vd. (2011) de benzer büyüklükteki düşürücü büyüme etkisi için istatistiksel destek göstermiştir. Reinhart vd. (2012) önceki araştırmaları destekleyen sonuçlara ulaşmıştır: kamu borcunun fazla olduğu dönemler diğer dönemlere kıyasla yüzde bir daha düşük büyüme ile ilişkilidir.

Büyüme odaklı borç analizinin yanı sıra literatüre, ülke gelir grubuna ve borç yapısındaki farklılığa göre borç yapısının etkisin analizini araştıran Jeanne vd. (2006) analiz sonuçlarına göre riskli borç biçimlerinin, özellikle de kısa vadeli ve/veya yabancı para cinsinden borçların yükselen piyasa ekonomilerinde krizlere karşı kırılgan hale getirdiği ve bu krizlerin yönetilmesini zorlaştıracak şekilde yıkıcı olduğu genel kabul görmektedir. Jeanne vd. (2006) argümanları, yükselen piyasa ekonomilerinde devlet borçlarının etkisi açısından ayrı bir grup olarak araştırılabilir hale getirmekte ve daha sonra bu etkiyi krizin bir nedeni olarak takip etmektedir. Jeanne vd. (2006) ülke grubu önerisine bağlı kriz etkileri farklılaşması Reinhart vd. (2013) tarafından da araştırılmıştır. Benzer bir şekilde, dünyada bilinen en şiddetli krizin ardından gelişmiş, zengin ekonomilerin yükselen piyasa ekonomileri öncesinde yaşanmış olan krizlerden finans merkezli başladıktan sonra reel sektörü etkisi altına almış olduğu için öncesinde ortaya çıkmış ve ülkeleri etkilemiş olan krizlerden tamamen ayrıştığı belirtilmektedir. 2007-08 finansal krizinin ardından

gelişmiş ülkeler, konjonktür karşıtı politikaları önemli ölçüde uygulama becerilerine bağlı olarak, kriz sonrasını yönetme konusunda çok daha başarılı olmuşlardır. Krizin, özellikle de ülke borçlarını artıran krizin yıkıcı etkileri önceki araştırmalar tarafından belirtilirken, Rogoff (2011) tersine, ülke temerrüt dalgasının küresel ekonomi için bir zorluk olabileceğini, öte yandan araştırmacı ekonomistlerin kamu borcu modellerini yeniden düşünmeleri için de önemli bir fırsat olduğunu iddia etmektedir.

Araştırmanın bu aşamasında, 2007-2008 finansal krizinin sonucu ortaya çıkmış olan durum karşısında ve Rogoff (2011) tarafından yapılan tavsiye doğrultusunda kamu borcunun, kamu iç borcu ve kamu dış borcunun üzerine araştırma yapılacaktır. Önceki çalışmaların bulguları doğrultusunda kısa vadeli ve yabancı para cinsinden alınan borçların ülke ekonomilerini daha kırılgan hale getirdiği ve yapılmış olan analiz sonucu elde edilen sonuçlar doğrultusunda en sık ortaya çıkmış olan krizin kamu dış borç krizi olması nedeniyle çalışılacak olan kamu borcu modeli kamu dış borç krizi analizi üzerine çalışılacaktır.

Önceki çalışmaların belirtmiş olduğu gibi kamu dış borç krizin ülke ekonomilerine olan maliyetinin çok yüksek olması nedeniyle, kamu dış borç krizinin gerçekleşme durumu ise kamunun temerrüde düşmesiyle olmaktadır. Kamu temerrüdünün ortaya çıkmasına neden olan faktörler, aynı zamanda dış borç krizne neden olan şartların ortaya çıkmasına neden olması sebebiyle Kamu temerrüdünün gerçekleşme olasılığını elde etmek için koşulları analiz etmenin çok önemli olduğu ortaya çıkmaktadır. Ülke riski terimi, Heffernan (1986) ve Sturzenegger vd. (2007) tarafından tanımlandığı üzere, bir hükümetin kreditörlerine olan borç yükümlülüklerini geri ödeyememe riskini tanımlamak için kullanılmaktadır. Belirtilmiş olan çalışmalar benzeri Literatürün büyük bir kısmı krizi ülke temerrüdü olarak tanımlayarak ve ülke temerrüdünün yıkıcı etkisini göz önünde bulundurarak ülke dış borç krizini araştırmıştır, bu araştırma da ülke temerrüdünün gerçekleşme olasılığını tanımlamayı ve tahmin etmeyi amaçlamaktadır. Bu hedefe ulaşmak için literatür, ülke temerrüdünü tahmin etmek için ülke riskini tanımlamıştır.

Krizin tanımına benzer şekilde, IMF raporu (2010) ülke riskini ölçen kesin bir formül olmadığını; kredi notları, devlet tahvili getiri farkları ve kredi temerrüt takasları kullanılarak hesaplandığını belirtmektedir.

Literatür, Cantor vd. (1996) tarafından önde gelen iki kuruluş olan Moody's ve Standard and Poor's tarafından ülke kredi notunun belirleyicileri ve etkilerinin analiz edildiği ve bir ülkenin notunun belirlenmesinde derecelendirme kuruluşlarının makroekonomik göstergelerinin önemli olduğu rapor edildiği için ölçüm tekniği analizi araştırmasının tamamını kapsamaktadır. Cantor vd. (1996) ölçüm tekniğine benzer şekilde, ülke kredi notları için Afonso (2003) önde gelen derecelendirme kuruluşları Moody's ve Standard and Poor's'u analiz ederek ülke kredi notunun belirleyici faktörlerini araştırmıştır. Önceki sonuçlara benzer şekilde, bu araştırmada da bir ülkenin kredi notunu belirlemede en önemli faktörün makroekonomik göstergeler olduğu sonucuna ulaşılmıştır.Gadanecz ve diğerleri (2014), yükselen piyasa ekonomilerinde döviz kuru riskinin yerel para cinsinden devlet tahvili getirilerini etkilemedeki rolünü analiz etmek için tahvil getirisi analizini ülke temerrüdü ile ilişkilendirmiştir. Bu çalışma, döviz kuru riskinin önemli bir etkisine işaret etmiştir: döviz kuru oynaklığı artarsa, yatırımcılar yükselen piyasa ekonomilerinde yerel para birimi devlet tahvillerini elde tutmak için daha büyük bir getiri telafisine ihtiyaç duymaktadır. Yakın zamanda Saji (2021), Cantor ve Pecker (1996) tarafından öne sürülen ve gelişmekte olan piyasalarda ülke notları ile tahvil getiri farkları arasındaki ilişkiyi araştırmayı hedefleyen hipotezi yeniden ele alarak ülke notları ile tahvil getiri farklarının bir karşılaştırmasını yapmıştır.

Bu araştırmada, derecelendirme notlarının gelişmekte olan piyasalardaki makroekonomik koşulların tamamını rapor etmediği ve kamuya uygun makroekonomik değişkenlerde, tahvil getiri farklarını tahmin etmede ülke derecelendirmelerinde gömülü olandan çok daha yararlı olan büyük bir kümülatif bilgi olduğu da belirlenmiştir. CDS ve getiri dağılımlarının karşılaştırılması Zhu (2006) tarafından incelenmiştir. Bulguların, tahvil dağılımları ve CDS dağılımlarının uzun vadede birlikte hareket ettiği yönündeki teorik öngörüyü doğruladığı belirtilmiştir. Bununla birlikte, kısa vadede bu ilişki her zaman geçerli değildir. Bu farklılığın iki piyasanın kredi koşullarındaki değişikliklere farklı yanıtlar vermesinden kaynaklandığı, iki dağılımları arasındaki dinamik bağlantılar araştırılarak, CDS piyasasının fiyat ayarlamasında genellikle tahvil piyasasının önünde hareket ettiği bildirilmektedir. Önceki araştırmalara ek olarak, Tang vd. (2008) CDS dağılımları önemli ölçüde etkileyen makroekonomik koşulları analiz

etmiş ve ayrıca piyasa koşulları ile firmanın kendine has özellikleri arasındaki etkileşimin önemini göstermiştir. Volatilite, sıçrama riski ölçümleri, makroekonomik koşullar ve bir firmanın bilanço bilgileri Zhang vd. (2009) tarafından bildirilen CDS dağılımları önemli ölçüde etkilemektedir. Bölgesel farklılıkların Kredi temerrüt takası dağılımlarının belirleyicileri üzerindeki etkisi Hassaan vd. (2019) tarafından analiz edilmiştir.

Bu çalışmaların ortaya koymuş olduğu sonuçlar doğrultusunda , kredi temerrüt takasına dayalı küresel perspektif analizi Durduabalerro, Farhi ve Gourinchas (2008) tarafından yapılmış ve ülkelerin küresel tasarruf sahipleri/sigortacılar için finansal varlık üretme kabiliyetlerini vurgulayan küresel dengesizliklere ilişkin bir başka analitik çerçeve önerilmiştir. Bu araştırmalara ek olarak, küresel dengesizliklerin ülke riskinin önemli bir makroekonomik belirleyicisi olduğu önceki çalışmalar tarafından bulgularla saptanmıştır (Back, Bandopadhyaya ve Du (2005); Wu ve Zhang (2008); Hilsher ve Nosbush (2010); Durdu, Mendoza ve Terrones (2013)) ve bu nedenle CDS dağılımlarının vade yapısında fiyatlanmaktadır (Pan ve Singleton (2008); Longstaff, Pan, Pedersen ve Singleton (2011)). Ayrıca, Huang ve diğerleri (2012) döviz alım satımları ile pozisyon çözme riski arasındaki ilişkiyi ve bunların ülke kredi primleri üzerindeki etkilerini analiz etmiştir. Gourinchas ve Rey (2007); ve Cabarello, Farhi ve Gourinchas (2008) analizlerini, bir ülkenin küresel dengesizliklere dışsal uyumunun döviz kurlarının değerlendirme kanalı üzerinden gerçekleştiği teorisine dayanarak yapmıştır.

2000'li yılların başında, Goldstein vd. (2000) tarafından döviz kuru faktörleri ülke temerrüdünün olası nedenleri arasından çıkarılmış olsa da, yaklaşık on yıl sonra Gadanecz ve diğerleri (2014) döviz kuru faktörlerinin ülke temerrüdünün önemli belirleyici faktörleri olduğunu, ülke temerrüdünün yerel para birimi devlet tahvili getirisi ile gösterilmesi durumunda rapor etmiştir. Gadanecz vd. (2014) benzer şekilde, bu tezde de döviz kuru faktörlerinin etkisi ülke temerrüdünün belirleyici bir faktörü olarak analiz edilmekte ve temerrüt üçüncü ölçüm tekniği olan kredi temerrüt swap dağılımları ile gösterilmektedir.

Literatürde kamu dış borcunun ve belirleyicileri üzerine yapılan çalışmalar sonucu, araştırmanın bu aşamasını kamu dış borç krizi ve belirleyicilerini incelenerek devam

edecektir. Kamu borç krizi belirleyicileri incelenirken literatürde üzerine tartışmalı olan döviz kuru faktörlerinin etkisinin araştırılmaktadır. Ülke riskini ise IMF'in risk ölçüm yöntemi olarak önermiş ve önceki çalışmalarda uygulanmış olduğu gibi kredi temerrüt takasları (CDS) ile ölçümlenmiştir. Bu iki değişken arasında olan değişim grafiksel olarak analiz edilmiştir.

Kredi temerrüt swap dağılımı 5 yıllık ve döviz kuru ilişkisi 1995-2020 yılları arasındaki dönem için analiz edilmiştir. Analiz tüm ülkeler, gelişmiş ülkeler, gelişmekte olan ülkeler, yükselen piyasa ekonomileri, finansal ülkeler ve finansal olmayan ülkeler için yapılmıştır.

Gelişmiş ülkeler için kredi temerrüt takasları yükselen bir değişim sergilerken, döviz kuru düşen bir patika izlemektedir. Gelişmekte olan ülkeler için ise kredi temerrüt swapları düşen, döviz kuru ise yükselen bir değişim izlemektedir. Yükselen ülkeler için kredi temerrüt takasları düşme eğilimi gösterirken, döviz kuru yükselme eğilimi göstermektedir. Finans merkezleri için, kredi temerrüt takasları yükselen bir değişim sahiptir, ancak döviz kuru düşen bir eğilim göstermektedir. Finansal olmayan merkezler için kredi temerrüt takasları düşen bir trend izlerken, döviz kuru artan bir trend izlemektedir. Tüm dönem, tüm ülkeler için yarı yarıya analiz edilmiş, analiz edilen tüm ülke türleri için her iki gösterge de her dönem için zıt yönlerde hareket etmiştir. Kredi temerrüt takasları CDS ve döviz kurunun tüm ülke setleri için analiz edilen dönemlerde zıt yönlerde hareket ettiği sonucuna ulaşılmıştır.

Bu sonuçlar, Corte vd. (2021), kredi temerrüt takası dağılımları ile ölçülen bir ülkenin ülke riskindeki artışa, para biriminde önemli bir değer kaybının eşlik ettiğini bildiren çalışmasıyla tutarlıdır. Dönem başı ile dönem sonu karşılaştırıldığında, kredi temerrüt swaplarının düşen bir patika izlediği, ancak döviz kurunun yükselen bir değişim sergilediği sonucuna ulaşılmıştır. Tüm ülke grupları için, her iki gösterge de analiz edilen tüm ülke tipleri için her dönem zıt yönlerde hareket etmektedir. Analiz edilen dönemlerde CDS ve döviz kurunun zıt yönlerde hareket ettiği sonucuna ulaşılmıştır.

Döviz kuru faktörleri ile ülke temerrütleri arasında grafiksel bir karşı döngüsel ilişki olduğu sonucuna ulaşılması sonucu; döviz kuru faktörlerini ülke riskini etkilemesi

ihtimal dahilinde olan diğer değişkenlerle birlikte etkisinin ölçümleneceği bir analize başlanmasını mümkün kılmıştır. Önceki araştırmalardan bazıları açıklayıcı değişkenlerini önceki araştırmalardan seçerken, diğerleri derecelendirme kuruluşlarından seçmektedir. Analizin bu aşamasında takip edilen Saji'nin (2021) bulguları doğrultusunda, açıklayıcı faktörleri önde gelen üç kredi derecelendirme kuruluşunun ülke riski değerlendirme kuruluşlarından : Standard and Poor's, Moody's ve Fitch'in veri setinden oluşturacağız. Bu veri setine dayanarak seçilen değişkenler ise ülke kısıtı altında kamuya açık verilerle sınırlandırılmıştır. Bu yaklaşımı takiben, veri setimiz döviz kuru faktörleri, yurtiçi faktörler ve uluslararası faktörlerden oluşmaktadır.

Bu çalışmada araştırılmakta olan ülke riski ile döviz kuru arasında olan ilişkinin analizini daha önce araştırmış olan Gadanecz vd. (2014) ile olan benzerlik ve farklılıklar mevcuttur. Her iki çalışmada döviz kurunun ülke riski üzerine olan etkisini araştırmaktadır.

Çalışmaların birbirinden ayrılmakta olduğu noktalara baktığımızda ise, Gadanecz vd. (2014) tarafından yapılan çalışmada ve yükselen piyasa ekonomilerinde(EMEs) yerel para cinsinden devlet tahvili getirilerini etkileyen döviz kuru riskini analizi yapılmaktadır. Bu araştırmada, onların çalışmasından dört kritik açıdan önemli ölçüde ayrılmaktadır.

İlk olarak, Gadanecz vd. (2014) döviz kuru faktörlerinin devlet tahvili getirileri üzerindeki etkisini araştırırken. Bu tezde çalışılan konu ise döviz kuru faktörlerinin ülke temerrütleri üzerindeki etkisini analiz ediyoruz, ki bu da kredi temerrüt swapları ile gösterilmektedir. İkinci olarak, Gadanecz vd. (2014) araştırma veri setini önceki çalışmaların rehberliğinde oluşturmuştur. Bu çalışmada ise, veri seti oluştururken, veri seti kısıtlaması altında IMF'in ve Alsonfo vd.(2003), Saji vd. (2021) araştırma sonuçlarını dikkate alarak veri setimizi 3 büyük kredi derecelendirme kuruluşundan oluşturuyoruz: Standard and Poors, Fitch ve Moody's ülke riski değerlendirme veri grupları baz alınarak oluşturuldu. Üçüncü olarak, Gadanecz vd. (2014) 20 yükselen piyasa ekonomileri (EMEs) üzerinde araştırma yapmıştır. Ancak, biz iki farklı veri seti oluşturuyoruz; ilk set birbirinden farklı gelir gruplarını içermekte olan tüm ülke

seti, gelişmekte olan, gelişmiş, finansal merkezler ve finansal olmayan merkezleri içeren 64 ülkeden oluşan Tüm ülkeler olarak tanımlanırken, ikinci set yükselen Pazar ekonomileri olarak tanımlanan ve 30 büyük yükselen ekonomi ülkesini içeren grubu tanımlanmaktadır. Dördüncü olarak, Gadanecz vd. (2014) 2005 ile 2013 zaman aralığını kapsayan dönem için analizini yaparken, bu çalışmada üzerinde çalışılmakta olan veri seti ise ile 2021 zaman aralığını kapsamaktadır.

Literatürün büyük bir kısmında panel veri sabit etki tahmini uygulanmıştır. Önceki araştırma tahmin tekniğini takip etmekle birlikte, yapılmış olan analizin teyit edilmesi amacıyla rassal etki tahmini ile Hausman Testini de uyguladık ve sonuçlar panel veri sabit etki tahmin prosedürünü uygulamanın gerekli olduğunu ortaya koydu. Veri setimiz, ilki tüm ülkeler ve ikincisi yükselen piyasa ekonomileri (EMEs) olmak üzere iki ana gruptan oluşmaktadır. Veri seti iki farklı küme arasında karşılaştırma yapılmasına olanak sağlayacak şekilde oluşturulmuştur; birincisi tüm ülke türlerini içermekte ve faktörlerin etkisini yorumlamak için ülke türünden bağımsızlığa izin vermektedir, ikinci grup ise sermaye akımlarının yükselen piyasa ekonomileri (EMEs) üzerinde diğer ülkelere kıyasla daha fazla etkisi olduğunu bildiren Lorca vd. (2021) gibi önceki araştırmaları bulguları göz önüne alınarak göre oluşturulmuştur.

Bu prosedürü uygulayarak, döviz kurunun ülke temerrüdü üzerinde herhangi bir etkisi olup olmadığını bulmayı amaçladık. Daha sonra ise bu etkinin ülke türüne bağlı olarak değişip değişmediğinin analizi yapılmıştır. Döviz kuru ile ülke temerrüdü arasındaki bağlantıda döviz kuru rejiminin etkisinin analiz edilmesi planlanmıştır. Ayrıca, sermaye açıklığının döviz kuru ve ülke temerrüdü arasındaki ilişki üzerinde herhangi bir etkisi olup olmadığının araştırılmaktadır. Ayrıca, küçük açık bir ekonomide döviz kurunun ülke temerrüdü üzerindeki etkisinin katkısı incelenmektedir.

Ülke temerrüdünün temel belirleyicilerini araştırıyoruz ve döviz kurunun ülke temerrüdü üzerinde herhangi bir etkisinin analizini bulmayı hedefliyoruz. Bu amaçla, üç ana gösterge grubu üzerinden araştırmamızı sürdürmekteyiz: döviz kuru faktörleri, yurtiçi faktörler ve uluslararası faktörler. Yurtiçi faktörler tüm ülke setleri

için önemli olmakla birlikte, yükselen piyasa ekonomilerinin analizinde kredi temerrüt takaslarının belirlenmesinde nispeten daha önemlidir. Hem tüm ülkeler seti hem de Yükselen piyasa ekonomileri (EMEs) için, doğrudan yabancı yatırımın (DYY), gayri safi yurt içi hasıla'ya (GSYH) oranı, yurtiçi göstergelerde kredi temerrüt dağılımları üzerinde en yüksek marjinal etkiye sahiptir. Uluslararası faktörler için duruma bakıldığında: VIX, kredi temerrüt takası dağılımı üzerinde neredeyse benzer bir marjinal etkiye sahip olan önemli bir belirleyici faktördür.

Döviz kuru faktörlerinin etkisinin ülke setine bağlı olarak farklı davranışlar gösterdiği sonucuna ulaşılmıştır. Gelişmiş ülkeler, Yükselen piyasa ekonomileri (EMEs) gelişmekte olan ülkeler, finansal ve finansal olmayan merkezlerden oluşan, tüm ülke tipleri için, yurtiçi ve yurtdışı belirleyici faktörler modele dahil edilerek tahminler yapıldığında, resmi döviz kurunun kredi temerrüt swaplarının önemli bir belirleyicisi olduğu görülmektedir. Ampirik analiz, yükselen piyasa ekonomilerinde (EMEs) tahmin sonuçları için, hem yurtiçi hem de uluslararası faktörler modele dahil edilerek ve hariç tutularak tahminler yapıldığında, hem resmi döviz kurunun hem de döviz kuru riskinin (döviz kuru oynaklığı ile temsil edilen) kredi temerrüt takasları için önemli belirleyici faktörler olduğunu göstermektedir.

Kredi temerrüt takas dağılımlarının (CDSs) için sabit etkiler panel modellerinin tahmin sonuçlarına göre, tüm ülkeler yapılan analiz sonuçlarına göre , Akaike bilgi kriteri dikkate alınarak uygulanan beş farklı model için, modelin döviz kuru faktörlerini, yurtiçi faktörleri ve uluslararası faktörleri içermesi gerekmektedir. Döviz kuru faktörü ülke temerrüdünün anlamlı bir belirleyici faktörü iken, yurtiçi faktörler dikkate alındığında özellikle doğrudan yabancı yatırımların GSYH'ye oranının marjinal etkisinin analiz edilen diğer göstergelerden daha yüksek olduğu, uluslararası faktörler değerlendirildiğinde ise özellikle VIX'in tüm ülke veri seti için ülke temerrüdünün tutarlı bir şekilde istatistiksel olarak anlamlı bir belirleyici faktörü olduğu sonucuna ulaşılmaktadır.

Yükselen piyasa ekonomileri (EMEs) için kredi temerrüt takas dağılımlarının (CDSs)sabit etkiler panel modellerinin tahmin sonuçlarına bakıldığında, beş farklı modelin tahmin edildiği ve Akaike bilgi kriterine bağlı olarak modelin döviz kuru

faktörleri, yurtiçi faktörler ve uluslararası faktörlerden oluşması gerektiği analizler sonucu elde edilmiştir. Yükselen piyasa ekonomileri (EMEs) için yapılan tahminlerde, hem döviz kuru hem de döviz kuru oynaklığı ülke temerrüdünün istatistiksel olarak anlamlı belirleyici faktörleridir. Tüm ülkeler için olduğu gibi, yurtiçi faktörler değerlendirildiğinde, özellikle doğrudan yabancı yatırımın, gayri safi yurt içi hasılaya oranı ile elde edilen indikatörün marjinal etkisi analiz edilen diğer faktörlerden daha yüksektir ve uluslararası faktörler için, özellikle VIX, yükselen piyasa ekonomileri veri seti için ülke temerrüdünün istatistiksel olarak anlamlı bir belirleyici faktörüdür.

Sabit etkiler panel modellerinin tahmin sonuçlarına göre, döviz kuru faktörlerinin etkisinin tüm ülkeler ve yükselen piyasa ekonomileri (EMEs) veri setleri arasında farklılık gösterdiği elde edilmiştir. Döviz kuru tüm ülkeler için sadece istatistiksel olarak anlamlı bir belirleyici faktör iken, buna ek olarak döviz kuru oynaklığı da Yükselen Piyasa Ekonomilerinde ülke temerrüdünün istatistiksel olarak belirleyici bir faktörüdür. Yurtiçi faktörler her iki grup için de marjinal etki açısından benzer davranış göstermektedir ve uluslararası faktörler açısından da özellikle VIX'in etkisi her iki grup için de aynıdır.

Literatür, Döviz kuru ve kredi temerrüt takas dağılımlarının arasındaki değişimi etkileyen belli başlı koşullar olabileceğine bunların ise analiz ile elde edilmiş olan bulguları değiştirebileceğini savunmaktadır. Bu çalışmada, araştırması yapılan faktörlere ise : ters nedensellik analizi, döviz kuru rejimlerinin ve sermaye açıklığıdır.

Ters nedensellik analizinin Döviz kuru ile kredi temerrüt takasları arasındaki nedenselliğe baktığımızda, Liu vd.(2012) döviz kuru ile kredi temerrüt takasları arasındaki nedenselliğn ters yölü olabileceğini savunmaktadır. Bir bakış açısına göre döviz kuru hareketleri ve oynaklığı kredi temerrüt takaslarını etkileyebilirken, diğer taraftan Liu vd. (2012) tarafından rapor edildiği üzere nedenselliğin kredi temerrüt takas dağılımlarından (CDSs) döviz kuruna doğru işlediğini iddia edenler de bulunmaktadır. Bu araştırma da bu önemli konuları araştırmayı amaçlamaktadır. Liu vd. (2012) savunmakta oldukları iddialar doğrultusunda, bu ana endojenliğin ana

nedeni olan potansiyel ters nedensellik analiz edilmiştir. Liu ve diğerlerini (2012) takiben, hem tüm ülkeler hem de yükselen piyasa ekonomilerinde ülke seti için 1 gecikmeli SGMM ve 2 gecikmeli SGMM modeli uygulanmıştır.

Roodman'a (2009) çalışmasının bulguları doğrultusunda , Sistem GMM tahmin sonuçlarımız Otokorelasyon (1) ve (2) koşullarını ve ayrıca Sargan testini karşılamaktadır. Öte yandan, döviz kuru faktörlerinin istatistiksel anlamlılığı etkilenmektedir. Panel sistem GMM sonuçlarının panel sabit etkiler yaklaşımı uygulanarak elde edilen sonuçlardan bazı farklılıklar gösterdiği görülmektedir.Tüm ülkeler seti tahmin sonuçlarına bağlı olarak, döviz kuru faktörlerinin marjinal etkisi azalmakta, diğer yandan hem yurtiçi faktörler hem de uluslararası faktörler artan ve azalan marjinal etkiler açısından farklılıklar göstermektedir. Yükselen piyasa ekonomilerinde ülke seti tahmin sonuçlarına göre döviz kuru için yurt içi ve yurt dışı faktörlerin marjinal etkileri bir patika izlemeden değişmektedir. Analizin sonucunda potansiyel nedensellik ile ilgili elde edilen bulgular Gadanecz vd. (2014) ile benzerlik göstermektedir.

Döviz kurlarının ve kredi temerrüt takas dağılımlarının (CDSs) etkisi dışsal göstergelere bağlı olarak değiştiğini savunmakta olan Domac vd. (2000) . Domac vd. (2000) döviz kuru rejiminin bu dışsal faktörlerden biri olduğunu iddia etmektedir. Araştırmanın bu aşamasında , döviz kuru rejimlerinin Döviz kurlarının ve kredi temerrüt takas dağılımlarının (CDSs) arasında olan ilişkiyi üzerine etkisi araştırılacak. Döviz kuru ve kredi temerrüt takasları arasındaki ilişkiyi etkileşime olan döviz kuru rejimine baktığımızda döviz kuru sınıflandırılması Ilzetzki vd. (2017) takip edilerek yapılmıştır. Buna göre sabit döviz kuru rejimi ve dalgalı döviz kuru rejimi olmak üzere iki temek rejime ayrılmıştır.

Elde edilen bulgulara göre, sabit döviz kuru rejimleri, makroekonomik, finansal ve dışsal temeller kontrol edildikten sonra, Domac vd. (2000) tarafından yapılan öncü çalışmalarda belirtildiği gibi, özellikle gelişmekte olan ülkelerde (DE) bankacılık krizi olasılığını azaltmaktadır. Esnek bir döviz kuru rejimi, tüm ülkeler ve yükselen piyasa ekonomilerinde yükselmekte olan ekonomiler için döviz kuru faktörlerinin önemini artırarak her iki ülke seti için de benzer bir etki göstermektedir. Bu sonuçlar

Domac ve diğerlerinin (2000) ülke temerrüt belirleyicilerinin dışsal faktörlere, özellikle de döviz kuru rejimine bağlı olduğu görüşünü desteklemektedir.

Tüm ülkeler için, döviz kuru faktörleri, yurt içi faktörler ve uluslararası faktörlere ilişkin olarak, marjinal katkılar döviz kuru rejimine göre ayrımdan etkilenmektedir. yükselen piyasa ekonomilerinde 'lerin tahmin sonuçlarına bağlı olarak, döviz kuru faktörlerinin ve uluslararası faktörlerin kredi temerrüt takasları (CDSs) üzerindeki marjinal etkileri döviz kuru rejimi ayrımından etkilenmektedir. Tahmin sonuçlarımız, döviz kuru rejiminin kredi temerrüt dağılımları (CDSs) üzerinde etkisi olduğunu rapor eden Gadanecz vd. (2014) ile benzerlik göstermektedir.

Buna ek olarak Lorca (2021) tarafından sunulan ülke temerrüdünü belirleyen faktörler için sermaye açıklığından da eklenmiştir. Lorca (2021) , faiz oranı, riskten kaçınma ve emtia fiyatlarındaki dalgalanmanın etkisini ölçerek gelişmekte olan piyasaları dikkate alan portföy sermaye akımları vakasını araştırmış ve sermaye akımlarındaki bir değişimin, çalışmanın ülke örneklemi genelinde toplam faaliyetin yaklaşık üçte birini oluşturduğunu rapor etmiştir. Öte yandan, tersine, Eichengreen vd. (1998) sermaye hesabı liberalizasyonunun ilk olarak muhtemelen iki farklı etkisi olduğunu, ilk mekanizmanın iç ve dış finansal istikrarın büyük ölçüde aynı olduğu mekanizma olduğunu belirtmektedir.

Analizin bu aşamasında sermaye açıklığının döviz kuru ve ülke temerrüdü arasındaki ilişki üzerinde herhangi bir etkisi olup olmadığını bulmayı amaçlıyoruz. . Yapılmış olan analiz bulgularına göre, hem tüm ülkeler hem de yükselen piyasa ekonomilerinde setleri sermaye açıklığına göre yüksek sermaye açıklığı ve düşük sermaye açıklığı olarak iki ayrı ülke grubuna ayrılmıştır

Sermaye açıklığının kredi temerrüt takası ve döviz kuru üzerindeki etkisi incelendiğinde, sonuçlar yüksek sermaye açıklığının tüm ülke setleri için döviz kuru faktörlerinin önemini artırırken, diğer yandan yükselen piyasa ekonomileri için düşük sermaye açıklığı için döviz kuru faktörlerinin öneminin arttığını göstermektedir. Tüm ülkelerin tahmin sonuçlarına göre, sermaye açıklığı döviz kuru faktörlerinin, yurtiçi faktörlerin ve uluslararası faktörlerin marjinal katkısını

etkilemektedir. Yükselen piyasa ekonomilerinde tahmin sonuçlarına göre ise sermaye açıklığı döviz kuru faktörlerinin, yurtiçi faktörlerin ve uluslararası faktörlerin marjinal katkısını etkilemektedir. Bu sonuçlar, Lorca'nın (2021) ülke temerrüdünü belirleyen faktörlerin sermaye hesabı açıklığından da etkilendiği yönündeki bulgularıyla ve dışa açıklığın ülke temerrüdü için önemli ölçüde gerekli olduğunu iddia eden Ogrokhina vd. (2019) ile benzerlik göstermektedir

Bu çalışmadan elde edilen sonuçlar, Gadanecz ve diğerleri (2014) gibi, kredi temerrüt takas dağılımlarının (CDSs) belirleyici göstergeleri dikkate alındığında, tüm ülkeler ve yükselen piyasa ekonomileri içindöviz kuru, yerel ve küresel faktörlerin göreli önemine ilişkin literatürdeki bulgularla da paralellik göstermektedir. Döviz kuru hem tüm ülkeler için hem de yükselen Pazar ekonomileri için istatistiksel olarak anlamlı bir belirleyici iken, döviz kuru volatilitesi de istatistiksel olarak anlamlı bir belirleyicidir. Yurtiçi faktörler, özellikle dış borç stoklarının GSYH'ye oranı, resmi rezervlerin GSYH'ye oranı ve doğrudan yabancı yatırımların GSYH'ye oranı , hem ülkeler hem de yükselen piyasa ekonomileri için kredi temerrüt swaplarının önemli belirleyicileridir. Ancak, kredi temerrüt swapları küresel sosyal ve parasal koşullardan da etkilenmektedir. Araştırma, bu çalışmanın başında hedeflenen sorulara veri kısıtlaması altında cevap vermiştir. Lehman Brothers'ın çöküşü, ABD'nin 2013'teki azaltım" artışı ve 2019 Küresel Covid Felaketi gibi spesifik olayların etkilerinin analiz edilmesi başta olmak üzere, ilave genişletme faktörleri aracılığıyla analizin genişletilmesi suretiyle tahmin edilen sonuçların iyileştirilmesi mümkündür.

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